DOCUMENT RESUME

ED 268 075 SP 027 044

AUTHOR	Peterson, Penelope L., Ed.; And Others
TITLE	The Social Context of Instruction. Group Organization and Group Processes. [Papers Presented at a Conference Held at The Wisconsin Center for Education Research (Madison, May 1982).]
SPONS AGENCY	National Inst. of Education (ED), Washington, DC.; Wisconsin Center for Education Research, Madison.
REPORT NO	ISBN-0-12-552220-7
PUB DATE	84
GRANT	NIE-G-81-0009
NOTE	258p.; Small print.
AVAILABLE FROM	Academic Press, Inc., Orlando, Florida 32887 ($32.00).
PUB TYPE	Reports - Descriptive (141) -- Books (010)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	Ability Grouping; Elementary Secondary Education; *Group Dynamics; *Grouping (Instructional Purposes); *Group Instruction; Heterogeneous Grouping; Homogeneous Grouping

ABSTRACT

This book is an outgrowth of a conference funded by the National Institute of Education and held at the Wisconsin Center for Education Research in May 1982. A major theme of this volume of collected papers is how and in what ways grouping of students can be used effectively. Papers included are: (1) "Instructional Groups in the Classroom: Organization and Processes" (P.L. Peterson and L.C. Wilkinson); (2) "Do Students Learn More in Heterogeneous or Homogeneous Groups?" (T.L. Good and S. Marshall); (3) "Grouping and Instructional Organization" (S.T. Bossert, B.G. Barnett, and N.N. Filby); (4) "The Social Organization of Instructional Grouping" (J.E. Rosenbaum); (5) "First-Grade Reading Groups: Their Formation and Change" (R. Dreeben); (6) "Effects of Race on Assignment to Ability Groups" (A.B. Sorensen and M. Hallinan); (7) "Frameworks for Studying Instructional Processes in Peer Work-Groups" (S.S. Stodolsky); (8) "Merging the Process-Product and the Sociolinguistic Paradigms: Research on Small Group Processes" (P.L. Peterson, L.C. Wilkinson, F. Spinelli, and S.R. Swing); (9) "Student Interaction and Learning in Small-Group and Whole-Class Settings" (N.M. Webb and C.M. Kenderski); (10)"Talking and Working Together: Status, Interaction, and Learning" (E.G. Cohen); (11) "The Development of Attention Norms in Ability Groups" (D.Eder and D. Felmlee); and (12) "Vygotskian Perspectives on Discussion Processes in Small-Group Reading-Lessons" (K. Hu-pei Au and A.J. Kawakami). M. Hallinan presents a summary and implications. Author and subject indexes are included. (CB)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED268075

The Social Context of Instruction

Group Organization and Group Processes

EDITED BY

Penelope L. Peterson, *Department of Educational Psychology*
Louise Cherry Wilkinson, *Department of Educational Psychology*
Maureen Hallinan, *Department of Sociology*
and Wisconsin Center for Education Research
University of Wisconsin—Madison
Madison, Wisconsin

"PERMISSION TO REPRODUCE THIS MATERIAL IN MICROFICHE ONLY HAS BEEN GRANTED BY

D. M. Stewart

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

- Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

1984

ACADEMIC PRESS, INC.
(Harcourt Brace Jovanovich, Publishers)
Orlando San Diego San Francisco New York London
Toronto Montreal Sidney Tokyo São Paulo

SP 027 044

EDUCATIONAL PSYCHOLOGY

Allen J. Edwards, Series Editor
Department of Psychology
Southwest Missouri State University
Springfield, Missouri

In preparation

John R. Kirby (ed.). Cognitive Strategies and Educational Performance

Published

Penelope L. Peterson, Louise C. Wilkinson, and Maureen Hallinan (eds.). The Social Context of Instruction: Group Organization and Group Processes

Michael J. A. Howe (ed.). Learning from Television: Psychological and Educational Research

Ursula Kirk (ed.). Neuropsychology of Language, Reading, and Spelling

Judith Worell (ed.). Psychological Development in the Elementary Years

Wayne Otto and Sandra White (eds.). Reading Expository Material

John B. Biggs and Kevin F. Collis. Evaluating the Quality of Learning: The Solo Taxonomy (Structure of the Observed Learning Outcome)

Gilbert R. Austin and Herbert Garber (eds.). The Rise and Fall of National Test Scores

Lynne Feagans and Dale C. Farran (eds.). The Language of Children Reared in Poverty: Implications for Evaluation and Intervention

Patricia A. Schmuck, W. W. Charters, Jr., and Richard O. Carlson (eds.). Educational Policy and Management: Sex Differentials

Phillip S. Strain and Mary Margaret Kerr. Mainstreaming of Children in Schools: Research and Programmatic Issues

Maureen L-Pope and Terence R. Keen. Personal Construct Psychology and Education

Ronald W. Henderson (ed.). Parent–Child Interaction: Theory, Research, and Prospects

The list of titles in this series continues on the last page of this volume.

Copyright © 1984–the Board of Regents of the University of Wisconsin System. Copyright is claimed until 1994. Thereafter, all portions of this work covered by this copyright will be in the public domain.

This book is based upon work supported by the National Institute of Education under Grant No. NIE-G-81-0009. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of the Institute or the Department of Education.

ACADEMIC PRESS, INC.
Orlando, Florida 32887

United Kingdom Edition published by
ACADEMIC PRESS, INC. (LONDON) LTD.
24/28 Oval Road, London NW1 7DX

Library of Congress Cataloging in Publication Data

Main entry under title:

Social context of instruction.

(Educational psychology)
Includes bibliographies and indexes.
1. Group work in education–Addresses, essays, lectures. I. Peterson, Penelope L. II. Wilkinson, Louise Cherry. III. Hallinan, Maureen T. IV. Series.
LB1032.S84 1983 371.2'5 83-9954
ISBN 0-12-552220-7

PRINTED IN THE UNITED STATES OF AMERICA

84 85 86 87 9 8 7 6 5 4 3 2 1

4/5

Contents

Contributors xi
Preface xiii

I. Introduction

1. Instructional Groups in the Classroom: Organization and Processes

Penelope L. Peterson and Louise Cherry Wilkinson

Introduction 3
Approaches to the Study of Groups in Classrooms: The Sociological, Sociolinguistic, and Process-Product Traditions . . . 3
A Model for Integrating the Research on Classroom Groups 6
Overview of the Chapters 7
References 11

II. The Organization of Instructional Groups

2. Do Students Learn More in Heterogeneous or Homogeneous Groups?

Thomas L. Good and Susan Marshall

Introduction 15
A Review of the Literature—Some Difficulties 16
Observational Studies of Tracking 21
Observational Research on Ability-Grouped Instruction 25
Composition Studies 32
References 37

3. Grouping and Instructional Organization

Steven T. Bossert, Bruce G. Barnett, and Nikola N. Filby

Introduction . . . 39
Grouping as a Coordinative Mechanism . . . 40
Classroom Grouping Structures . . . 41
Grouping Studies and the Configurational Perspective . . . 45
Linking Instructional Organization and Grouping . . . 49
References . . . 50

4. The Social Organization of Instructional Grouping

James E. Rosenbaum

Overview . . . 53
Social Attributes of Instructional Grouping . . . 54
Studies of the United States Educational System . . . 56
Typology of Institutions . . . 57
Effects of Grouping Systems on Student Outcomes . . . 61
Implications: Improve Selection Decisions or Redesign Structures? . . . 64
Implications for Research . . . 66
References . . . 67

5. First-Grade Reading Groups: Their Formation and Change

Robert Dreeben

Research on Grouping . . . 69
The Nature of Grouping . . . 72
A Note on the Data and on the Argument . . . 73
Grouping and Instruction . . . 74
The Formation of Groups . . . 74
Changes in Grouping Arrangements . . . 79
Final Observations . . . 83
References . . . 83

6. Effects of Race on Assignment to Ability Groups

Aage B. Sørensen and Maureen Hallinan

Introduction . . . 85
Data and Methods . . . 88
The Effect of Student Race and Achievement on Ability-Group Assignment . . . 91
Classroom-Level Analysis . . . 94
A Return to Individual-Level Analysis . . . 98

Conclusion . . . 102
References . . . 102

III. *The Processes of Instructional Groups*

7. Frameworks for Studying Instructional Processes in Peer Work-Groups

Susan S. Stodolsky

Overview: Instructional Forms in Classrooms . . . 107
Instructional Groups in Classrooms . . . 112
Experimental Approaches to Cooperative Learning . . . 116
Some Descriptive Studies . . . 116
Factors Influencing Peer Work-Group Processes and Outcomes . . . 118
Summary and Conclusion . . . 121
References . . . 122

8. Merging the Process–Product and the Sociolinguistic Paradigms: Research on Small-Group Processes

Penelope L. Peterson, Louise Cherry Wilkinson, Francesca Spinelli, and Susan R. Swing

Background and Rationale . . . 126
Statement of the Research Questions . . . 128
Method . . . 129
Sociolinguistic Analyses . . . 132
Process–Product Analyses . . . 138
Comparison of the Results of the Process–Product and the Sociolinguistic Analyses . . . 148
Conclusions and Implications . . . 150
References . . . 151

9. Student Interaction and Learning in Small-Group and Whole-Class Settings

Noreen M. Webb and Cathy Moore Kenderski

Introduction . . . 153
Method . . . 156
Results . . . 160
Discussion . . . 166
References . . . 170

10. Talking and Working Together: Status, Interaction, and Learning
Elizabeth G. Cohen

Introduction 171
Method 174
Measurement 176
Results 178
Discussion 182
Implications for Diversity 185
References 186

11. The Development of Attention Norms in Ability Groups
Donna Eder and Diane Felmlee

Background 189
Methods 191
Quantitative Model 193
Hypotheses 193
Results 195
Analysis of Outside Interruptions 197
Analysis of Group Reassignment 200
Discussion 204
References 207

12. Vygotskian Perspectives on Discussion Processes in Small-Group Reading-Lessons
Kathryn Hu-pei Au and Alice J. Kawakami

Introduction 209
Vygotsky 210
The Experience–Text–Relationship Method 211
The Present Study 213
Methods 214
Results 216
Discussion 220
Conclusions 222
References 224

IV. Conclusion

13. Summary and Implications
Maureen Hallinan

Overview 229
Generalizations about the Effects of Instructional Grouping 230

Implications for Research on Instructional Groups 233
Implications of Instructional-Group Research for Educational Practice and Policy 236
Conclusions 238
References 239

Author Index 241
Subject Index 247

Contributors

Numbers in parentheses indicate the pages on which the authors' contributions begin.

KATHRYN HU-PEI AU (209), Kamehameha Early Education Program, Kamehameha Educational Research Institute, Honolulu, Hawaii 96817

BRUCE G. BARNETT (39), Far West Laboratory for Educational Research and Development, San Francisco, California 94103

STEVEN T. BOSSERT (39), Far West Laboratory for Educational Research and Development, San Francisco, California 94103

ELIZABETH G. COHEN (171), School of Education, Stanford University, Stanford, California 94305

ROBERT DREEBEN (69), Department of Education, University of Chicago, Chicago, Illinois 60637

DONNA EDER (189), Department of Sociology, Indiana University, Bloomington, Indiana 47405

DIANE FELMLEE (189), Department of Sociology, Indiana University, Bloomington, Indiana 47405

NIKOLA N. FILBY (39), Far West Laboratory for Educational Research and Development, San Francisco, California 94103

THOMAS L. GOOD (15), Center for Research in Social Behavior, University of Missouri, Columbia, Missouri 65211

MAUREEN HALLINAN (85, 229), Department of Sociology and the Wisconsin Center for Education Research, University of Wisconsin—Madison, Madison, Wisconsin 53706

ALICE J. KAWAKAMI (209), Kamehameha Educational Research Institute, Honolulu, Hawaii 96817

CATHY MOORE KENDERSKI (153), Graduate School of Education, University of California, Los Angeles, Los Angeles, California 90024

SUSAN MARSHALL (15), Center for Research in Social Behavior, University of Missouri, Columbia, Missouri 65211

PENELOPE L. PETERSON (1, 125), Department of Educational Psychology and the Wisconsin Center for Education Research, University of Wisconsin—Madison, Madison, Wisconsin 53706

JAMES E. ROSENBAUM (53), Department of Sociology, Northwestern University, Evanston, Illinois 60201

AAGE B. SØRENSEN (85), Department of Sociology and the Wisconsin Center for Education Research, University of Wisconsin—Madison, Madison, Wisconsin 53706

FRANCESCA SPINELLI (125), Department of Communication Sciences, Case Western Reserve University, Cleveland, Ohio 44106

SUSAN S. STODOLSKY (107), Department of Education, University of Chicago, Chicago, Illinois 60637

SUSAN R. SWING (125), Wisconsin Center for Education Research, University of Wisconsin—Madison, Madison, Wisconsin 53706

NOREEN M. WEBB (153), Graduate School of Education, University of California at Los Angeles, Los Angeles, California 90024

LOUISE CHERRY WILKINSON (1, 125), Department of Educational Psychology and the Wisconsin Center for Education Research, University of Wisconsin—Madison, Madison, Wisconsin 53706

Preface

In our present educational system, grouping of students has been the mechanism most typically used by educators to respond to student diversity. In April 1983, the National Commission on Excellence in Education published its final report, which decried the mediocrity of education in the United States and argued for educational reform, recognizing a pressing need to change the educational process so that the diverse needs of students are met. A major theme of the present volume is how and in what ways grouping of students can be used effectively to respond to student diversity and to promote excellence in education.

The book is organized around two major topics: the organization of instructional groups and the processes of instructional groups. In the chapters dealing with group organization, the authors consider such issues as the factors that affect the formation of instructional groups, the characteristics of students that are used by teachers in forming groups, the size and stability of instructional groups in the classroom, and the effects of different grouping patterns on student outcomes. In the chapters on group processes, the authors consider such issues as the conceptualization of group processes, the relationship of group organization to group processes, the relationship of group processes to student outcomes, the effects of student characteristics on group processes, and the mechanisms through which instructional groups have their effects. In the final chapter in the volume, we discuss common threads and conclusions that can be drawn from the theoretical and empirical research presented. In addition, we suggest possible directions for future research and implications of the work presented in these chapters for educational policy.

Throughout the volume, these topics and related issues are addressed by researchers from three different approaches: sociological, sociolinguistic, and process–product. Sociologists have been concerned with the organizational differentiation of students, particularly the assignment of students to groups and the consequences of grouping patterns for student outcomes. Like the sociologists, the sociolinguists have also been concerned with the social context of instruction but, unlike the sociologists, they have focused primarily on the processes that take place within the social context of instruction, particularly the use of language in classroom interaction. Process–product researchers, on the other hand, have tended not to focus on the organization of the classroom, but instead have studied teacher–student interaction processes and attempted to determine which teacher–student interaction patterns and behaviors facilitate student achievement.

Given the diverse research perspectives, as well as the broad topics and issues, presented in this volume, the audience for this volume is a wide one. One audience is researchers, including sociological, sociolinguistic, process–product, and educational researchers, for whom this volume provides a summary of our understanding of group organization and group processes, as well as theoretical perspectives to guide future research. A second audience is educational practitioners who are concerned both with how instructional groups are currently being used by teachers and with how teachers may organize instructional groups more effectively to promote student achievement, social skills, and motivation. A third audience consists of policymakers at the local, state, and national levels, who will find in this volume a useful summary of findings on group organization and processes that have important implications for promoting excellence in education.

This volume is the outgrowth of a conference funded by the National Institute of Education and held at the Wisconsin Center for Education Research, University of Wisconsin—Madison, in May 1982. The purpose of the conference was to bring together a multidisciplinary group of scholars to present their research on the topic of student diversity and instructional groups, to integrate their findings across disciplines, and to discuss the implications of this work for research and practice. As can be imagined, the gatherings of such a diverse group of scholars resulted in a spirited discussion and a lively exchange of ideas. In this volume, we have attempted to maintain that lively discussion and spirited exchange of ideas from diverse research perspectives.

We gratefully acknowledge the assistance of staff of the National Institute of Education, including Virginia Koehler and Mike Cohen, and the Wisconsin Center for Education Research, which provided funds for the conference on which this volume is based. Participants at the conference included the senior contributors of the chapters, the editors of this volume, Bruce Barnett, Carolyn Evertson, Nikola Filby, and the following persons, who served as discussants: Marianne Amarel, Courtney Cazden, Edward Fuentes, Marlaine Lockheed, and Cora Marrett. Special thanks go to Janet Lindow, Susan Swing, Jean Norman, and Bob Cavey for their assistance during the conference and during the preparation of this volume.

I

Introduction

CHAPTER 1

Instructional Groups in the Classroom: Organization and Processes

PENELOPE L. PETERSON AND
LOUISE CHERRY WILKINSON

Introduction

Placing students in groups for instruction is a common practice within American classrooms. The chapters in this volume are representative of contemporary research, both theoretical and empirical, on this topic. Several issues are addressed in the work presented here, including the variety of grouping practices and instructional groups, group processes, and the consequences for students' achievement. *Grouping practices* refers to the basis on which students are assigned to groups, including the type of instructional task, the composition, the size, and the stability of instructional groups. A key distinction between instructional groups is whether they are teacher directed or student directed.

Each of the chapters in this volume discusses at least one type of instructional group, which was formed on the basis of particular grouping practices. Some of the chapters focus primarily on organizational factors whereas other chapters focus primarily on processes within groups. In this introductory chapter, we first provide an overview of three social scientific paradigms that have been applied to the study of instructional groups: sociological, sociolinguistic, and process–product approaches. Second, we propose a framework for the integration of the three approaches. Finally, we briefly describe each of the separate chapters in this volume.

Approaches to the Study of Groups in Classrooms: The Sociological, Sociolinguistic, and Process-Product Traditions

Research on classroom groups has tended to follow one of three distinct traditions: the sociological tradition, the sociolinguistic tradition, or the process–product tradition. Sociological researchers have been concerned with the organizational differentiation of

THE SOCIAL CONTEXT OF INSTRUCTION
Group Organization and Group Processes

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-552220-7

students, particularly the assignment of students to groups and the consequences of grouping patterns for students (see, for example, Cohen, 1979; Sorensen, 1978). Sociolinguistic researchers have focused on the use of language in classroom interaction. (See for example, National Institute of Education, 1977; Wilkinson, 1982). Finally, process-product researchers have studied teacher-student interaction processes and have attempted to determine what teacher-student interaction patterns and behaviors facilitate student achievement (see, for example, Dunkin and Biddle, 1974; Medley, 1979).

In addition to having unique foci, the research traditions have differed in their assumptions and their research methods. Sociologists have assumed that the classroom is a miniature social system that must be considered within the context of larger social systems such as the school and society. Indeed, many sociologists have focused on the school rather than the classroom as the unit of analysis. A second assumption is that in our society the school serves the primary functions of socialization and selection (Parsons, 1959.) Third, the organizational structure of the school and the classroom are directly related to the functions of socialization and selection. Thus, sociologists have been interested in determining the basis for grouping patterns that exist within the school, and the extent to which these grouping patterns serve to differentiate students in terms of social status and educational level.

A primary methodological technique used by sociologists has been large-scale survey research. Relevant variables such as student ability, status, and achievement are measured by administering questionnaires and tests to a large sample of students and teachers. Statistical analyses, such as multivariate regression, are then performed to examine the relationships among these variables. In general, sociologists have not been concerned with the classroom processes that mediate between the organizational structure (e.g., classroom grouping-patterns) and the effects of the organizational structure on students. Sociolinguists and process–product researchers, on the other hand, have been concerned primarily with the processes of classroom interaction.

Sociolinguists have assumed, first, that interaction in classroom activities requires competence in both the structural and functional aspects of language. To participate effectively in the life of classrooms, children must have more than academic knowledge alone; they must know how to participate in and understand the social interactions in the classroom. A second assumption is that the classroom is a unique communicative context, although it shares some general characteristics with other contexts such as the home. Communication between teachers and students in the classroom is structured to facilitate the acquisition of academic information by students. A third assumption is that students differ in their communicative competence, particularly in aspects of competence that are important in the classroom.

The goal of sociolinguistic analysis is the description of social, interactional processes. The primary methodological technique used by sociolinguistic researchers is descriptive and observational research, with specific tools that have been borrowed from the fields of psychology, linguistics, and anthropology. These include naturalistic observation, linguistic field description, ethnography, and participant observation. Thus, sociolinguistic research consists primarily of descriptions of the language and accompanying nonverbal signals used by people in interaction with one another. For example, in the field of education, several researchers have studied teachers' and students' use of language in reading groups. (Eder, 1982; McDermott, 1976; Mehan, Hertweck, Combs, & Flynn, 1982; Merritt, 1982; Wilkinson & Calculator, 1982).

Like the sociolinguistic researchers, process–product researchers have investigated classroom processes. However, process–product researchers have focused on those cognitive aspects of classroom processes that facilitate student achievement (see, for example, Rosenshine, 1979), whereas sociolinguists have focused on the use of language in classroom interaction (see, for example, Wilkinson, 1982). Process–product researchers have assumed, first, that teacher behavior affects student behavior, which in turn, affects student achievement. A second assumption is that teacher behavior, student behavior, and student outcomes can be measured and quantified. Process–product researchers have typically used an observation instrument to record teacher and student behaviors and a standardized achievement test to assess student outcomes (Dunkin & Biddle, 1974; Koehler, 1978; Rosenshine & Furst, 1973). Preference has been given to low-inference measures of classroom behavior rather than high-inference measures. Such measures tend to involve counting discrete instances of the occurrences of behaviors rather than making more global ratings of teaching style (Doyle, 1978). After teacher behaviors, student behaviors, and student outcomes have been measured and quantified, then correlational analyses are performed to examine the relationship between teacher behaviors and student outcomes.

Process–product researchers have typically not investigated the effects of different patterns of instructional grouping on the processes that occur in instructional groups in the classroom (Good, 1981). However, recent research on assigning students to small peer-work-groups and allowing them to teach one another suggests that peer work-groups may be particularly effective, at least for some kinds of students (Peterson & Janicki, 1979; Peterson, Janicki, & Swing, 1981; Swing & Peterson, 1982; Webb, 1977).

This volume includes work of researchers from each of the three preceding traditions. Multidisciplinary perspectives are important as well as useful because they may provide additional information to address research questions that have not been answered conclusively by research within a given approach. For example, sociologists have conducted considerable research on the question of "What are the effects of ability grouping and tracking on students' learning?" After three decades, this research has been inconclusive (see Sørensen, 1978). However, insights from research employing a sociolinguistic and a process–product approach, taken together with research from a sociological perspective, may shed light on the mechanisms through which ability groups have their effects and thereby resolve some of the previous ambiguity. Thus, the multidisciplinary approach of this volume is advantageous because it brings to bear research on the same problem from several perspectives. On the other hand, for a multidisciplinary approach to be successful, there must be a mechanism for integrating the diverse perspectives. In the next section of this introductory chapter, we propose such a model, as applied to the study of the processes and organization of instructional groups in classrooms.

A Model for Integrating the Research on Classroom Groups

The sociological, sociolinguistic, and process–product research traditions can be conceptualized within the model presented in Figure 1. The model lays out the variables that have been addressed by sociological, sociolinguistic, and process–product researchers and are addressed by authors of the chapters in this volume: (*a*) student diversity; (*b*) variations in classroom organization; (*c*) teacher–student and student–student interaction processes; and (*d*) student achievement, motivation, and social skills. Hypothesized relationships among these variables are also presented in the model.

The model can be understood by describing, first, examples of specific operational variables to be addressed within each of the four major conceptual variables in the model and second, the hypothesized relationships among variables that are denoted by the arrows in the model. The concept of student diversity includes variables such as student ethnicity, linguistic–cultural background, socioeconomic status, gender, age, ability, motivation, prior achievement, and personality. Student diversity can be further subdivided into dynamic characteristics (those that can be changed) and static characteristics (those that cannot be changed). Dynamic characteristics include such variables as motivation and prior achievement; static characteristics include such variables as gender and ethnicity.

Although researchers in all three traditions have considered student diversity, they have tended to focus on different aspects of student diversity. Sociologists studying classroom grouping have tended to focus on measured ability and social status as important aspects of student diversity. Sociolinguists, on the other hand, have tended to consider ethnicity, language knowledge, and gender. Process–product researchers, to the extent that they have considered student diversity, have often focused primarily on student ability and prior achievement.

The second major variable, variations in the classroom organization, includes such specific variables as heterogeneous versus homogeneous ability-grouping in reading and mathematics, teacher-led instructional groups in reading and mathematics, and use of peer work-groups in the classroom. Although many of the authors in this volume deal with different variations in the classroom organization, the variations can be systematically contrasted on significant dimensions such as size of the instructional group, composition of the instructional group, and whether the group is a student-led or a teacher-led instructional group. The third variable is teacher–student and student–student interaction processes. These processes are described by observing the teacher interacting with students and students interacting with other students. Examples of specific processes include the amount and type of explaining by the students and by the teacher in small groups of students, the kinds of requests for information and action used by students, the amount of time a student is on-task or engaged in learning, and peer interactions and friendship patterns within ability groups.

The fourth category of variables includes students' scores on standardized achievement tests in reading and mathematics as well as student's achievement of the day-to-day goals of instruction as measured by students' scores on worksheets, daily assignments, and teacher-made tests at the end of a unit of instruction. Examples of student motivation include students' reports of the amount of effort they are currently putting into their school work and students' reports of their attitudes toward mathematics and reading. An example of students' social skills is competence in social situations.

The arrows in the model designate hypothesized relationships among the variables in the model. Each arrow designates a hypothesized causal relationship between one variable and another. Both student diversity and variations in classroom organization are hypothesized to affect the quality, amount, and kind of teacher–student and student–student interactions that occur in the classroom. Teacher–student interactions and student–student interactions, on the other hand, mediate among student diversity and student achievement, motivation, and social skills and also among variations in classroom organization and student achievement, motivation, and social skills. Student diversity within a classroom is hypothesized to affect the variations that the teacher selects to make in classroom organization, and the dynamic characteristics of student diversity are themselves affected by student achievement, motivation, and social skills. This latter relationship makes the model a recursive one. In other words, student diversity is a potential cause of variation in student achievement, motivation, and social skills, but some aspects of student diversity are also affected by students' prior achievement, prior motivation, and social skills.

Overview of the Chapters

This volume is divided into two sections: the organization of instructional groups and the processes of instructional groups. These two topics reflect the differing emphases of the research traditions already described, as well as differing foci on the variables in the model in Figure 1.

The Organization of Instructional Groups

The authors of the chapters in this section address issues such as the following:

What is the basis for the formation of instructional groups?
To what extent are student characteristics such as ability, race, and gender used by the teacher in forming groups?
How do instructional groups tend to be organized in reading and in mathematics?

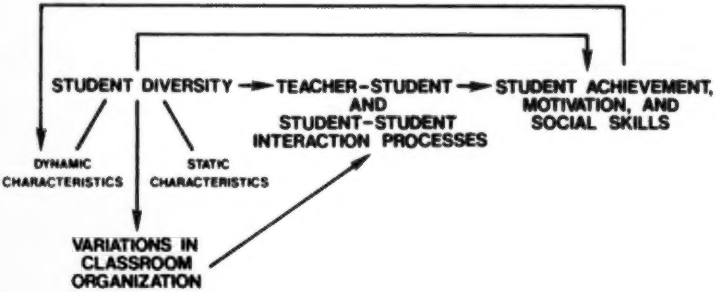
STUDENT DIVERSITY
TEACHER-STUDENT AND STUDENT-STUDENT INTERACTION PROCESSES
STUDENT ACHIEVEMENT, MOTIVATION, AND SOCIAL SKILLS
DYNAMIC CHARACTERISTICS
STATIC CHARACTERISTICS
VARIATIONS IN CLASSROOM ORGANIZATION

Figure 1. A model for integrating the research on classroom groups.

Do these groups tend to be teacher directed or peer directed?
What is the typical size of instructional groups in reading and mathematics?
What are the effects of different organizational patterns on student achievement, motivation, and social skills?

Good and Marshall (Chapter 2) address the issue of students' learning in heterogeneous versus homogeneous groups. They focus on factors in the existing literature that render it difficult to draw conclusions about the effects of heterogeneous versus homogeneous grouping. These include (*a*) the lack of observation and the need for more careful definition of terms, and (*b*) the need for the consideration of societal views about the importance of schooling during eras when data on ability grouping have been collected. The authors discuss studies of ability grouping that have included observational measures of classroom processes. They seriously question the value of tracking and ability grouping within classrooms in light of the admittedly spotty extant literature.

Bossert, Barnett, and Filby (Chapter 3) argue that most studies of American classrooms have adopted a static and mechanistic view of grouping processes. These studies have focused on describing how students in classes with different compositions or in different instructional groups are treated differently by a teacher or by their fellow students. The authors present an alternative view of a dynamic approach to grouping that considers the interaction between the task and the group structures. They consider grouping as a coordinative mechanism by which teachers and students organize their work for specific tasks. They examine the linkages among group assignment, the allocation of resources, and task characteristics, which they view as critical variables in identifying the differences in grouping practices and their effect on students' learning and development. They outline a conceptual model and describe areas where additional research is needed.

Rosenbaum (Chapter 4) argues that the literature on the social organization of instructional grouping is replete with contradictory findings. He contends that previous research is based on a faulty model of a single United States educational system. Previous work glosses over the complexities and differences among studies and ignores crucial dimensions of the social organization of grouping that may affect how grouping operates and the ultimate effects of grouping on students' learning and development. Rosenbaum presents data that indicate how structural dimensions of grouping may mediate the effects of schools on student outcomes. He also considers implications for the design of grouping systems and for future research in this area.

Dreeben (Chapter 5) addresses the formation and change of first-grade reading groups. The basic question concerns how the distributional properties of classrooms, particularly the distribution of students' reading readiness scores, affect the formation and composition of reading groups. He concludes that ability grouping within classes, like tracking, is an organizational response to an organizational problem, namely, how to transform a class characterized by diversity into suitable units for instruction. He also concludes that a classroom grouping arrangement, that is, a configuration of groups of different number, sizes, and compositions, has direct implications for instruction but only indirect ones for learning, because the learning is mediated by instruction and other factors.

Sørensen and Hallinan (Chapter 6) examine the effects of race on assignment of students to ability groups. Using a large number of California classrooms, they attempt to demonstrate the need for a more adequate model of the assignment process. The research shows that there is no direct individual-level effect of race on ability-group assignment but that race influences the formation of ability groups. High-ability groups tend to be larger in racially mixed classrooms, giving black students an increased chance of being assigned to a high group. White students have the same advantage in these classrooms, however, so the phenomenon cannot be viewed as overt discrimination against whites. The chapter also shows that the use of appropriate statistical models that can adequately mirror the assignment process is essential to the detection of meaningful findings.

The Processes of Instructional Groups

The authors of the chapters in this section address questions such as the following:

How are group processes conceptualized?
How are the processes related theoretically to both the organization of and the outcome of instructional groups?
How do aspects of student diversity affect the processes of instructional groups?
What are the mechanisms through which instructional groups have their effects?

Stodolsky (Chapter 7) provides an analysis of approaches to the study of instructional processes used in peer work-groups. She presents a conceptual model that includes a general view of the causes and consequences of instructional forms in classrooms. She also presents a typology of instructional groups as they are used in contemporary United States and British classrooms. Her description focuses on the use and processes of peer instructional-work-groups including (*a*) the definition of these groups, (*b*) experimental and descriptive studies, and (*c*) factors influencing the group processes and the outcomes.

Peterson, Wilkinson, Spinelli, and Swing (Chapter 8) illustrate how research on small group processes is enhanced by an interdisciplinary approach that merges two paradigms used in contemporary educational research: the process–product and the sociolinguistic paradigms. The authors describe the results of a study that addressed the following questions: (*a*) What are the processes that occur in small groups that are significantly related to student achievement (for example, providing and receiving explanations, requests for information, and procedural requests)? and (*b*) How do these processes mediate achievement? Taken together, the results of the process–product and sociolinguistic analyses converged in suggesting that for some students, assuming the role of taskmaster in the small group by providing managerial explanations, making procedural requests, providing answers, and engaging in answer checking, had positive effects. On the other hand, the results of the process–product analyses indicated that for other students, particularly low-ability students, the processes of small-group interaction were not facilitative of achievement. The authors conclude with a discussion of how research on small-group processes might be informed by considering both process–product and sociolinguistic variables.

Webb and Kenderski (Chapter 9) examine the relationship between student interaction and achievement in two classroom-grouping-arrangements: a small-group setting and a whole-class setting. Student interaction in the classes was tape-recorded, and students' questions, explanations, and errors were identified. The major purpose of the study was to determine whether interaction patterns that have been observed in small groups occur in the whole-class setting, and whether these interaction patterns have the same impact on learning that they do in small groups. The findings show that there is infrequent interaction among students in the whole-class setting, and most interaction occurs between teacher and student. These two findings suggest that experiences of students in the small-group and the whole-group settings are different, but the differences do not necessarily affect what is learned.

Cohen (Chapter 10) describes her study of the relationships among students' social status, frequency of student interaction, and student achievement. Her work is motivated by expectation states theory, which specifies a direct relationship among these three variables: expectations are reflections of status, which in turn affect interaction and achievement in the classroom. The data reported here are from a project examining organizational conditions for the implementation of a bilingual curriculum designed to teach cognitive skills. The results support expectation states theory and show that interdependencies of students are sufficient to enable status characteristics to be salient and relevant to expected competence in curricular tasks.

Eder and Felmlee (Chapter 11) examine students' attentiveness, particularly the development of different attentional norms, as a basic classroom process that occurs within small groups. Their analysis of the data from one classroom shows that assignment to a low-ability group greatly increases the likelihood that students will become inattentive during group lessons. They combine quantitative and qualitative approaches to examine the processes that produce the group effects. They discuss the ways in which group members and the teacher establish norms governing inattentive behavior. These norms seem to depend on different ability-group levels, and they have different consequences for students' learning.

Au and Ignacio (Chapter 12) apply some of Vygotsky's ideas about the relationship of speech and thought to the analysis of the processes involved in reading groups. They focus on the ways in which teachers in the bilingual Kamehameha school lead discussions in reading groups that help students to develop their academic skills. Their data show that (*a*) the instructional value of different types of teacher questions may be more accurately judged in the context of the entire instructional event; and (*b*) definitions of comprehension instruction need to be expanded to include at least some teacher questions on text content or product-oriented questions. The authors conclude that the Vygotskian perspective allows a better understanding of why reading lessons that contain a more implicit form of comprehension instruction are effective for some students in improving reading achievement, particularly for young disadvantaged Hawaiian students.

Conclusions

In the final chapter (Chapter 13) Hallinan presents an analysis and summary of the chapters. She discusses six generalizations that can be drawn from the research about the organization, processes, and effects of instructional groups. In addition, she suggests directions for future research on instructional grouping and discusses implications of this research for educational practice and policy.

References

Cohen, M. *Recent advances in our understanding of school effects research.* Paper presented at the Annual Meeting of the American Association of Colleges of Teacher Education, Chicago, March 1979.

Doyle, W. Paradigms for research on teacher effectiveness. In L. S. Shulman (Ed.), *Review of research in education.* Itasca, Illinois: Peacock, 1978.

Dunkin, M. J., & Biddle, B. J. *The study of teaching.* New York: Holt, Rinehart & Winston, 1974.

Eder, D. Differences in communicative styles across ability groups. In L. Cherry Wilkinson (Ed.), *Communicating in the classroom.* New York: Academic Press, 1982.

Good, T. L. *Research on teaching* (Tech. Rep. No. 207). Columbia, Missouri: Center for Research in Social Behavior, University of Missouri, 1981.

Koehler, V. Classroom process research: Present and future. *Journal of Classroom Interaction*, 1978, *13*(2), 3–11.

McDermott, R. *Kids make sense: An ethnographic account of the interactional management of success and failure.* Unpublished doctoral dissertation, Stanford University, 1976.

Medley, D. M. The effectiveness of teachers. In P. L. Peterson & H. J. Walberg (Eds.), *Research on teaching: Concepts, findings, and implications.* Berkeley, California: McCutchan, 1979.

Mehan, A., Hertweck, A., Combs, E., & Flynn, P. Teachers' interpretations of students' behavior. In L. Cherry Wilkinson (Ed.), *Communicating in the classroom.* New York: Academic Press, 1982.

Merritt, M. Distributing and directing attention in primary classrooms. In L. Cherry Wilkinson (Ed.), *Communicating in the classroom.* New York: Academic Press, 1982.

National Institute of Education. Teaching as a linguistic process. In *Basic skills research grants announcement.* Washington, D. C.: National Institute of Education, 1977.

Parsons, T. The school class as a social system: Some of its functions in American society. *Harvard Educational Review,* 1959, *29,* 297–318.

Peterson, P. L., & Janicki, T. Individual characteristics and children's learning in large-group and small-group approaches. *Journal of Educational Psychology,* 1979, *71,* 677–687.

Peterson, P. L., Janicki, T., & Swing, S. R. Ability × treatment interaction effects on children's learning in large-group and small-group approaches. *American Educational Research Journal,* 1981, *18*(4), 453–473.

Rosenshine, B. Content, time and direct instruction. In P. L. Peterson & H. J. Walberg (Eds.), *Research on teaching: Concepts, findings, and implications.* Berkeley, California: McCutchan, 1979.

Rosenshine, B, & Furst, N. The use of direct observation to study teaching. *Second handbook of research on teaching.* Chicago: McNally, 1973.

Sorensen, A. B. *The organizational differentiation of students in schools.* Paper presented at the National Invitational Conference on School Organization and Effects, San Diego, January 1978.

Swing, S. R., & Peterson, P. L. The relationship of student ability and small-group interaction to student achievement. *American Educational Research Journal,* 1982, *19*(2), 259–274.

Webb, N. M. *Learning in individual and small-group settings.* (Tech. Rep. No. 7) Stanford, California: Aptitude Research Project, School of education, Stanford University, 1977.

Wilkinson, L. Cherry (Ed.), *Communicating in the classroom.* New York: Academic Press, 1982.

Wilkinson, L. Cherry, & Calculator, S. Requests and responses in peer-directed reading ability groups. *American Educational Research Journal,* 1982, *19*(1), 107–120.

II

The Organization of Instructional Groups

Do Students Learn More in Heterogeneous or Homogeneous Groups?

THOMAS L. GOOD AND
SUSAN MARSHALL

Introduction

A key aspect of educational programs is the assignment of students to classrooms. Beliefs about how students should be assigned are varied and often contradictory, and important questions (Should high and low achievers be taught in the same class or in homogeneous groups within a class? Should second and third graders be taught together?) are answered in different ways by various educators and writers. Research studies and reviews of research have yielded complex responses to questions about whether students should be taught in homogeneous or heterogeneous settings.

Research on *tracking* (students are assigned to separate classes on the basis of ability) and on *ability grouping* (students are assigned to separate groups within the same classroom) illustrates that the ability of learners in a class or group has complex relationships to students' achievement and attitudes (Esposito, 1973; Persell, 1977; Rosenbaum, 1976). Indeed, Webb (1982) found that the effects of assignment to heterogeneous groups for instruction are mediated by the quality of instruction and the participants' willingness to seek assistance from other students, as well as the gender, personalities, and abilities of students.

Our original purpose in writing this paper was to review existing research on ability grouping and tracking, and to summarize some of the consequences of heterogeneous and homogeneous grouping practices for high- and low-achieving students. We realized that others had found that the effects of grouping were complex, but we had hoped to be able to identify new trends by examining several variables at the same time. That is, rather than take a "one variable" approach (effects of homogeneous grouping versus heterogeneous grouping), we wanted to study the effects of other

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-552220-7

variables (e.g., age of students, subject matter, class-group size as well). We intended to emphasize studies that included observational data on instruction; however, we were unable to integrate research on ability grouping, largely because so few researchers actually *observed* instructional process.

Goals of Chapter

In the first section we discuss factors that prevent a simple summary of the literature, including the lack of observation, the need for more careful definitions of terms (e.g., heterogeneous, homogeneous), and the need to consider differences in societal views about the importance of schooling during various eras when ability grouping data have been collected.

In the second section of the chapter, we discuss tracking studies that include classroom observational data. In the third part of the chapter, studies of ability grouping that include observational measures of classroom processes are examined. Although the complete literature on ability grouping is complex, tracking and ability group studies that include observational measures generally indicate that tracking and ability grouping have few desirable consequences for low-ability students. In this section we seriously question the value of tracking and ability grouping within classrooms.

In a fourth section of the chapter we discuss some new research on classroom composition, the potential contributions of these studies, and the need for future studies in this area. In particular, we advocate the integration of classroom composition studies with task-structure and task-demand research (Doyle, 1979).

A Review of the Literature—Some Difficulties

There are numerous reasons why it is difficult to compare and to integrate studies of ability grouping and teaching. First, the studies vary considerably in scope and purpose. Studies also differ in the number of students, the number of groups, and the size of the classes involved (and sometimes it is impossible to obtain this information). Such variation in samples makes it difficult to determine whether results are dependent upon class size and/or the combination of students in a classroom. Simply put, the effect of class homogeneity and/or heterogeneity may be mediated by class size, and in some studies these variables are confounded or unspecified, or both.

Goldberg, Passow, and Justman (1966) note that studies provide different instructions with regard to holding the curriculum and methods of teaching constant. In some studies teachers were requested to keep content and teaching method the *same* for all groups. However, in other studies enrichment materials and increased pace were provided for bright students; in yet other studies program modifications were made for slower but not for faster ones. Sometimes teachers were given specific instructions about how to vary their behavior, but some researchers provided no explicit directions. Obviously, such procedural variations among studies make it impossible to determine whether (and how) variation in student ability, class size, instruction, or materials affects outcome measures. Goldberg, Passow, and Justman also point out that researchers often ignore the teacher factor in designing experiments. Thus, there often was no way to separate teacher qualities from organizational–student composition factors.

In our review of the literature, we are impressed by differences between societal views of education that existed in the 1920s and 1930s, and those of the 1960s (and subsequently). These views must be considered when interpreting the results of studies. Early studies suggest that students most likely to be "victimized" by ability group assignments were high-ability students; more recent research indicates that students most likely to be "victimized" by group assignments are low-ability students (although studies at any time have produced mixed results). Some reasons for these discrepant findings are discussed here subsequently.

Perhaps the most important difference between school practices in the 1920s and recent practices is related to the fact that in the past there were many *other* socially acceptable options available to students who did not complete high school or college. There were apprentice programs for plumbers, electricians, bricklayers, and so on, which enabled students to leave school and find meaningful employment. Assignment to a low group probably did not have the negative consequences that it may have in the 1960s and later, when high school graduation was mandatory and a college degree almost required for satisfactory employment. For both students and teachers, the perceived consequences of assignment to low groups may have been less significant than they are presently.

There are other difficulties in comparing studies conducted in the 1920s and 1930s with research in the 1960s. In the 1920s and 1930s a somewhat smaller percentage of students was enrolled in public schools. In the 1920s schools were more likely to expel students for serious misbehavior. Furthermore, the retention of students who failed to achieve satisfactorily was a much more common practice in earlier times. The low achievers present in classrooms during the 1920s probably varied considerably from low achievers of today. Furthermore, the average number of pupils in a classroom has varied considerably from time to time in this century. Conclusions based on studies that are more than 10 years apart appear to be precarious.

In addition to the problems just described, the literature is further weakened by the fact that a rather narrow approach has been taken. We were struck by the fact that the homogeneous–heterogeneous question was typically approached as a one-variable problem. That is, much of the research is based on the belief that there is a single answer to the question, Is homogeneous or heterogeneous grouping better?, at least for particular types of students. This belief has probably led many investigators to study class heterogeneity without carefully considering the types of students involved, the community being served, the quality of instruction, and many other variables. As a result of focusing on one variable, poor definitions of heterogeneous and homogeneous classes abound, and most researchers have not observed classroom instruction. In our opinion, unspecific definitions of terms and lack of classroom observation are major impediments to summarizing this literature.

Defining Homogeneous and Heterogeneous Conditions

The descriptions of student samples in the literature (especially older studies) are often so vague that it is difficult to define what is meant by the terms *homogeneous* and *heterogeneous*. We suspect that in some studies classes that were labeled heterogeneous were in fact more homogeneous than classes labeled as homogeneous in other studies. For example, because the students in the school studied by Goldberg *et al.* (1966) were primarily middle-class, it is likely that some of the classrooms that were called heterogeneous in this sample would in fact be called homogeneous in studies of schools that served more heterogeneous populations.

Because descriptions of the characteristics of students in particular *classrooms* were seldom given, it was impossible to tell in many cases whether the students were labeled as heterogeneous because of criteria relative to the particular sample from which they were drawn, or more absolute standards. Defining homogeneity and heterogeneity is especially difficult in nonexperimental studies. Here attempts to achieve homogeneity are constrained by the variation in the student population from which instructional groups are formed. This means that grouping or non-grouping may achieve very different degrees of homogeneity–heterogeneity across schools differing in their student body composition.

There are many reasons why a class might be labeled heterogeneous. For example, a class (Type A) might have one-third high-aptitude students (IQ of 125 or better), one-third students with aptitudes ranging from 100 to 124, and one-third of students ranging from 85 to 99. Another heterogeneous class (Type B) could have one-half the students with IQs between 115 and 130, and the other half with IQs ranging between 85 and 100. Indeed, the *mean ability* of these two classes would be similar in many cases, although the teaching demands would be quite different in the two situations.

On the other hand, two classes could be heterogeneous (e.g., either Type A or Type B), but their overall ability levels could be very different. One class could have high ability and little variation or variation in both ability and range of student ability. Similarly, the composition (variation and mean ability) of homogeneous classes can vary widely as well.

Yet another type of heterogeneous class (Type C) might contain 25 of 30 students at grade level, one student two grades above grade level, and four students three grades below grade level. This heterogeneous class is different from Types A and B, and as such it would require dissimilar instruction. There are many types of heterogeneous and homogeneous classes and most studies can ask only *one* of the many variations of the general question, Do students learn more in heterogeneous or homogeneous classes?

Unfortunately, in addition to the tendency some investigators have to overgeneralize their data, many often report their samples so inadequately that it is impossible to determine which specific question they are addressing.

A CASE STUDY

Although in many studies the sample descriptions were woefully inadequate, some researchers did describe their samples adequately. Still, it is difficult to compare studies. As a case in point, we describe a study (Drews, 1962) designed to assess the effects of homogeneous and heterogeneous grouping on students at three ability levels in ninth-grade English classes. In the study, 101 superior, 251 average, and 80 slow students were assigned to homogeneous and heterogeneous classes. Drews attempted to maintain a ratio in heterogeneous classes of 2–3 superior students, 25–30 average students, and 2–3 slow students. It is clear that this definition of heterogeneity was closest to the *Type C* definition described here previously. Obviously, this study only narrowly addresses the relative advantages and disadvantages of heterogeneous grouping.

There were 30–35 students in each class, except for the homogeneous slow classes (15–20). Superior students had an average IQ of 135, average students an average IQ of 100, and slow students an IQ of 86 (the term *slow* was used by Drews). At first glance it seems that we have a reasonable definition of the independent variable. But do we? The IQs within the superior group had to vary somewhat, and it may be that one heterogeneous class had two students with IQs of 125, but another heterogeneous class might have contained two superior students with IQs of 140. Indeed, average students often show considerable variation as well and it is likely that the mean ability and the range of ability will vary to some extent (and in some individual classes perhaps considerably) within heterogeneous classes. These subtle differences in the composition of classes might affect the effectiveness of homogeneous and heterogeneous groups, but unfortunately, many investigators report data for homogeneous or heterogeneous classes as a group and do not examine the distribution of ability within individual classes. The description provided in the Drews study is reasonable, but does not provide sufficient detail for comparing her research with others.

Drews found that teachers in both heterogeneous and homogeneous classes formed the same number of groups in their classrooms. Teachers based their instruction on three to five student-levels, independent of whether the class had a 5-grade range (homogeneous) or a 13-grade range (heterogeneous). Although this finding is interesting, the possibility that the labels (a 5-grade range vs. a 13-grade range) may be somewhat misleading must be considered. Recall that in each heterogeneous class a teacher only had to accommodate two or three superior students and two or three slower students. Hence, if we compare the results of this study to other studies (where it is even more difficult to specify the composition of particular classrooms), an 8-grade range in a different study might produce a more difficult teaching situation if there were *more* high and low students that teachers had to accommodate (for example, consider the Type A and Type B heterogeneous classrooms that we discussed previously). Still, it is significant that the presence of heterogeneous or homogeneous groups of students in this study had little effect on teachers' decisions about the number of groups they would form for instruction.

The verbal behavior of teachers in heterogeneous classes was similar to that of teachers in the superior homogeneous classes, although high-achieving students dominated discussion in heterogeneous classes. In contrast, homogeneous grouping increased participation and involvement in academic and social activities for most students, especially for slow learners.

Our interpretation of the study is that the demand characteristics of teaching in heterogeneous classrooms in which there are some capable students make it more likely that teachers will present *more theory* and *conceptualization* than they will when teaching homogeneous groups of average and slow students. However, this interpretation is dependent upon the particular distribution of students in this study. There were many average students in these classrooms and only a few superior and slow students. Two or three superior students in a class otherwise filled with below-average students might not have any desirable effects on classroom processes and achievement.

The Drews study also suggests that although low and average students benefitted from the higher level of thought usually present in heterogeneous classes, the lows also suffered the consequences of less direct participation in social and academic affairs in these classrooms. Unfortunately, observational data presented are too meager to allow any firm conclusions. Furthermore, it is impossible to determine whether teachers responded to relative or absolute student differences. That is, were differences in achievement and teacher behavior due to the student composition of the classroom or to the teacher's perceptions of the relative heterogeneity of the class (his or her perception of how the class should be taught)?

NEED FOR MORE OBSERVATION: A CASE STUDY

Goldberg *et al.* (1966) classified 3000 fifth-graders in 45 elementary schools into five IQ levels varying from low-average to gifted (the five levels were: 130 and higher, 129–20, 119–110, 109–100, and 99 and below). The school district largely served a middle-SES population. Eighty-six fifth-grade classes were eventually organized on the basis of 15 ability grouping patterns. Each pattern was classified as representing one of three IQ ranges: narrow (an IQ spread of about 20 points), medium (an IQ spread of at least 30 points), and broad (an IQ spread of at least 40 points).

The investigators reported that there were significantly greater achievement gains in heterogeneous, broad-range classes than in medium- or narrow-range classes, across all five ability-levels. Achievement increments were seen in social studies, reading vocabulary, and three areas of mathematics. However, differences among the three types of classes were generally quite small.

Certain types of students affected general classroom achievement. Regardless of the class ability-range, the presence of gifted students (IQ 130 or above) affected the achievement of other students in science and to some extent in social studies. Conversely, low-average students tended to have a positive effect on the arithmetic computation scores of other classmates. Goldberg *et al.* argue that these findings may shed some light on the generally superior attainment of all ability levels in the broad-range classes.

At a minimum, these data suggest that high- and low-achieving students can learn when taught together in the same class (at least under certain conditions). Goldberg, Passow, and Justman argued that narrowing the range of student ability and teaching many low students in the same class led teachers to set lower standards.

Goldberg *et al.* also examined the effect of being in a particular classroom and found that for most pupils *specific classroom membership influenced achievement* as much as the ability pattern of the class. That is, within different types of homogeneous and heterogeneous classes, achievement variation within an ability pattern was as wide as were variations across ability patterns. *Teaching effects* were quite obvious; within a grouping condition, some teachers obtained more achievement from students than did other teachers.

Teachers' effects on different types of students were stronger than teachers' ability to get gains across different subject areas. Simply expressed, teachers who were getting good achievement gains in a particular subject obtained those gains from most of the students in their classrooms. However, teachers' ability to obtain achievement varied considerably from one subject area to another.

As we noted in the previous study (and as in most ability studies), heterogeneity has advantages and disadvantages. Goldberg *et al.* found that slow pupils' self-concepts were lower in broad-range (i.e., heterogeneous) classes than in others. In explaining the drop in self-esteem for slow pupils in the heterogeneous classes, Goldberg *et al.* suggest that despite their higher achievement than comparable students in homogeneous classes, the only thing slow pupils in these classes had to compare their behavior to was that of their brighter classmates.

What is known in this study is that teacher effects were as important as were grouping effects; however, we do not know how the behavior of teachers who generally got more gain from students was different from the behavior of teachers who achieved less with their classes. Also, we know that in general, across all ability levels of students, achievement was higher in heterogeneous than in homogeneous classes and this was particularly the case for low students. However, we do not know *how* these results were achieved because there are no process data to describe the instruction and curriculum that was presented. In conclusion, it seems clear that research will not be able to respond to the question, Do students learn best in homogeneous or heterogeneous classes? until student heterogeneity is defined more carefully and unless we observe classroom conditions more carefully than we have in the past.

Observational Studies of Tracking

Sophisticated studies of classroom process in tracked schools were very rare until recently in American schools. Recent observational studies of tracking suggest (*a*) that the assignment of students into lower tracks (where they receive all instruction only with other low-achieving students) generally leads to inferior teaching and opportunity to learn (*b*) that, at a minimum, assignment into a low track maintains or sustains student performance at a low level (and often may lead to deterioration).

Because of space limitations, only one observational study of tracking is discussed here. A study by Schwartz (1981) was chosen for illustrative purposes because it examines school process in tracked classrooms across a number of different process variables. We have not reproduced details of his methodology here, because those are available elsewhere (Schwartz, 1981). Briefly, the research was conducted primarily in one New York City elementary school and secondarily in three Philadelphia schools (one junior high and two elementary). The four schools studied differed in size and ethnic composition; however, all four schools served predominantly working-class populations.

Peer Effects

Schwartz found consistent differences in student behavior in high- and low-track classes throughout the sample. For example, during whole-class discussion, he found that students' behavior in low-track classrooms could be characterized as challenging teachers, obstructing academic activity, and misusing educational resources.

Schwartz (1981) found that during seatwork students in the high track took advantage of the situation in order to engage in minor misbehavior. However, he argues that their behavior was still basically task-oriented during seatwork and that although they competed during seatwork, high-track students still facilitated each other's academic efforts.

In contrast, when students in the low track were assigned independent seatwork and freed from the potential need to defend themselves against public academic humiliation and failure, they tended to discuss among themselves social and other events outside of school. Hence, tracking in this study was associated with a peer culture that promoted academic goals in high-track classes but impeded them in the low-ability classes.

Schwartz also reports evidence to illustrate the devastating impact of tracking on low-ability students and their rejection by peers. He found that 50% of lower-track students chose more high- than low-rank peers to "hang around with most." In marked contrast, less than 1% of high-track students chose to spend time with low-track over high-track classmates.

Although research is needed, it is our belief that peer influences in low-ability groups tend to be unavoidable and strong enough to overwhelm the potential instructional advantages of grouping (i.e., few teachers are capable of teaching low groups effectively, especially in secondary schools). Appropriate teacher expectations, instructional behavior, and group management may allow low groups to be taught effectively in some instances, but we suspect that the structural effects of teaching lows together in a large group are difficult to overcome. We now turn to a discussion of some research that has examined teacher behavior and attitudes in tracked classes.

Teacher Behavior and Attitudes

Schwartz found that teachers in low-track classrooms made fewer demands on students and applied less exacting standards both to students' performances as well as to their own teaching. He interpreted this finding to mean that teachers in low-track classrooms did not want to risk failure with pupils whom they viewed as difficult if not impossible to motivate. Others, too, have commented on the fact that teachers appear to be less serious when interacting with low-track than with high-track students (see, for example, Keddie, 1971; Leacock, 1969).

In addition, teacher comments on students' record cards indicated to Schwartz that teachers' commitments to an evaluation of high- and low-track students varied notably. Over the course of the study he found a progressive disparity in the length and nature of teachers' year-end comments about high- and low-ability students. In general, teachers became more positive in their comments about high-track students and made more elaborate and lengthy comments about them. In contrast, students in low-track classrooms were progressively described in briefer and more pejorative terms. These students often received only one-word comments on their record cards.

Schwartz also found that the standards and sanctions utilized for high- and low-track students varied. Teachers complained more about low-ranked students' behavior but actually punished students in high classes more frequently. Indeed, teachers followed through on punishments and discipline three times more often in high than in low sections, even though students were warned about misbehavior more frequently in low than in high classes. However, students in high tracks were more likely to be praised and rewarded for academic achievement than students in low classes. These data again suggest that when teachers instruct high sections they are more serious and more careful about their own behavior as well as that of students.

Similarly, Hargreaves (1967) reports that teachers in one English comprehensive school had lower standards for the lower-stream students than for the higher-stream ones. Keddie (1971) also found that teachers' classroom behaviors indicated that they held lower standards and, indeed, teachers' self-reports also supported the contention that low-track students received less demanding and less interesting curriculum assignments than students in other tracks. Keddie (1971) argues that the structural influence of grouping is so powerful that once inside the low-ability classrooms even those teachers who most actively oppose tracking on moral and/or philosophical grounds become unwittingly ensnared in its framework.

Instructional Content

Surprisingly, Schwartz did not find much difference in the actual content of instruction that was offered to high-track and low-track students, although the abstractness of the content presented did vary between high and low classes. For example, in the junior high schools teachers often presented the *same material* with different emphases to high and low classes.

It is commonly argued that the content taught in a heterogeneous class must be so diverse for students of various abilities that there is a *need* to track students by ability so that content can be adjusted more easily. In this study, Schwartz found that students were asked to suffer the social consequences of being labeled (as members of the low-track classroom) but received neither a distinctive nor an appropriate curriculum.

In a study of tracking in British schools, Heathers (1967) found that teachers stressed basic skills and facts and used drill much more when interacting with "slow" learners, whereas they emphasized conceptual learning and independent projects with highs. Similar instructional differences were noted by Keddie (1971) in a study of a British comprehensive school. She found that the content assigned to high- and low-track students might be superficially similar, but that the emphasis was quite different for the students. For example, students in both tracks might study taxation, but the high-track class would study how different types of taxation work and the low-track classroom would learn how to fill out the forms.

Hargreaves (1967) found that in many schools poorer teachers were often assigned to teach low-ability classes and that both teachers and students knew this. Rosenbaum (1976) found that teachers reported that they prepared more for college-track than for non-college track classes and that they perceived that lower-business and general-track classes were so undemanding as to require little or *no* preparation at all. Thus, even when non-college-track students had the same teachers as college-track students, they did not get as much attention, concern, or effort from their teachers. Observational data in Rosenbaum's study provide prima facie evidence that the academic needs of low-track students were simply not being met in low-track classes.

Evertson (1982) compared average- and low-ability classes taught by the same teachers in junior high schools and found that lower-ability classes tended to have more off-task, inappropriate, and disruptive student behavior. Also, teachers in low classes were less consistent in handling behavioral problems, less clear in instruction, and less effective in adjusting instruction to fit students' interests and backgrounds than when they taught average-ability classes. Metz (1978) also controlled for teacher effects by observing the same teachers instructing classes dissimilar in ability and reached conclusions similar to those reported by Evertson and Schwartz.

General Conclusions

Other studies that have examined instructional processes in schools that practice tracking have yielded somewhat similar conclusions. For example, in a review of tracking literature, Persell (1977) has noted that students in low-track classes tend to receive less appropriate student–teacher interaction, instruction and resource materials, and student–student interaction.

Rosenbaum (1976) studied the effects of tracking in a relatively *homogeneous* working-class neighborhood and found process dimensions associated with class placement simliar to those reported by Schwartz. Lower-track placement was associated with *easier* and more *boring* work. In addition, grades were less variable and lower in these classes, despite the fact that content was less challenging.

Most of the observational data describing what takes place in track classes is recent. *Observational* studies of tracking show a consistent pattern of deprivation for low students in schools that practice tracking. Considering this evidence and the fact that there is *not* a single observational study to show positive consequences for low-track students, it seems unthinkable to support tracking educational policies generally. The evidence consistently suggests that low-track students may be placed into difficult situations that hinder their academic progress.

There appears to be little justification for tracking in elementary or middle schools. The issues in high schools are more complex and merit additional research. Because of present schooling practices, high-school students often become quite differentiated in terms of their abilities and interests. Some students are headed for college and want and need courses in language and advanced courses in mathematics and science; other students want specialized business or industrial courses. A key aspect is the difference between presenting the same content to all students versus presenting clearly diverse content to various students because they want to concentrate in different subject matter areas. Tracking (assuming that all students are actively taught) may make sense in secondary schools when personal and curriculum *content* goals are different.

Observational Research on Ability-Grouped Instruction

Having examined some of the observational literature on tracked classes, we now discuss observational studies of heterogeneous classes in which students receive portions of their instruction in ability groups within classrooms. Most of this research has been conducted in elementary schools, and most of it has focused on reading group instruction. In this section we discuss research on elementary classes in which students are grouped by ability for reading instruction.

In general, observational studies of reading instruction indicate that most teachers allocate equal time to different reading groups, although researchers have obtained other results on occasion. McDermott (1976) found that the differences in time allocation were in part due to student behavior. He found that students in the low group had less time to read because of interruptions from other students in the class. He also concluded that the behavior of students in the low group made it easy for other students in the class to interrupt them.

Recent observational research has consistently shown that teacher and student behavior, and thus the quality of instruction, varies in high and low reading-groups (Allington, 1983). However, it is not always clear whether differences in teacher behavior toward highs and lows are appropriate or not, and how such differences affect student achievement. From research conducted thus far, one cannot ascertain whether teacher behavior determines student behavior, or whether student needs and abilities dictate teacher perceptions and behavior.

Most researchers who have observed reading-group behavior have found differences between high and low groups that appear to be pejorative and unnecessary. In many cases these differences involve the same types of behaviors that others might interpret as appropriate.

A case in point is Alpert's (1974) study in which she observed the top and bottom reading-group sessions in 15 second-grade classrooms on three occasions to determine whether teachers adapted methods and materials to the two groups of students. She found that teachers used a great variety of readers and emphasized meaning (rather than decoding) when teaching high groups. Alpert interprets this as appropriate teacher behavior and argues that this behavior is consistent with students' needs. Because high pupils had mastered basic decoding skills, an emphasis on comprehension in these groups was appropriate. More work on decoding was needed in low groups because they did not possess these skills. These results illustrate the interpretation (causation) problem mentioned previously. Alpert interprets the differential behavior and materials given low-group students as appropriate; however, we wonder if any instructional approach can be useful if it does not stress the meaning and substance of the assignment. If teachers do not emphasize meaning, students may only mechanically respond to material with little interest in reading for meaning or enjoyment.

One of the most interesting studies of instruction in high and low first-grade reading groups in one classroom was conducted by Eder (1981). She found that students who were likely to have difficulty in learning to read generally were assigned to groups whose *social context* was not very conducive to learning. In part, this was because assignments to first-grade reading groups were based upon kindergarten teachers' recommendations, and a major criterion of placement was the *maturity* of the students as well as their perceived ability.

Most of the students in the study were relatively homogeneous in terms of their academic ability and socioeconomic background (students were from middle-class homes). More important, none of the students could read prior to entering first grade. Despite the relatively *homogeneous* nature of this student population, the first-grade teacher still grouped pupils for reading instruction.

In the early grades, it is probably necessary to group for instruction in reading. For example, it is important for teachers to elicit frequent overt responses from each individual pupil and in this sense grouping is probably necessary. However, this purpose (small instructional groups) can be achieved without ability grouping. Where grouping is necessary to allow teachers to deal with manageable numbers of students, such grouping need not yield high-, middle-, and low-ability groups. Despite the possibility of random or deliberately heterogeneously formed groups, teachers routinely assign students to groups on the basis of perceived ability—even when the objective differences between students are small (as Eder found).

Behavioral Differences

Eder found that the teacher discouraged interruptions of a student's oral reading turn within the high group but not in the low group. She believes that the teacher may have been concerned with maintaining the interest of the low group during other students' reading turns (in general, their reading turns tended to be longer and filled with more pauses); the teacher may also have thought that lows had less intrinsic interest in the material; therefore, the teacher was more willing to encourage most forms of participation or responses from low students but demanded more appropriate behavior and responses from highs.

Eder (1981) reports that because the most immature, inattentive students were assigned to low groups, the teacher was almost certain to have more managerial problems (e.g., distractions) with these groups than with others, especially early in the year. Indeed, because the teacher was often distracted from a student reader in the low group who was responding (because of the need to manage other students in the group), students often provided the correct word for the reader. Readers were not allowed time to ascertain words on their own, even though less than a third of the students interviewed reported that they liked to be helped, because they thought this interfered with their own learning. Eder's work indicates that low students had less time than highs to correct their mistakes before other students and/or the teacher intervened.

Eder also found that students in the low group spent 40% of their listening time not attending to the lesson(vs. 22% in the high group). Low students frequently read out of turn, adding to the general confusion. Eder reports twice as many teacher managerial-acts in the low group as in the high group (157 versus 61), and found that turn interruption increased over the course of the year.

Similar findings have been reported by other researchers. As noted here previously, McDermott (1976) found in one classroom that the low group was interrupted more frequently by other students in the class than was the high group. Allington (1980) found that teachers were more likely to interrupt low-group readers during reading than they were high-group readers, especially when lows made oral reading mistakes.

Allington (1983) found that good readers read about three times as many words as poor readers and that three-fourths of their reading was done silently. In contrast, poor readers usually read orally (and therefore more slowly). Although results vary somewhat from study to study, the general findings are that both the form and quality of instruction vary between high and low groups. Perhaps the most common finding reported across studies is that low students are interrupted by teachers and other pupils in the group proportionately more often following errors than are other students.

Effects of Group Placement

In many studies, initial differences between readers in high and low groups within classrooms are not particularly large, and the criteria for placement into particular groups often involve students' social maturity as much as their cognitive ability or their perceived reading ability. Even after students are placed into reading groups, teachers may inadvertently evaluate skills other than reading performance per se (i.e., ability to talk about a story not because of general information gained from the story, but because of more generalized information; ability to anticipate teacher expectations). However, the effects of differential teacher behavior and instructional content may unnecessarily increase achievement differences between high and low groups.

It may be that limited instructional opportunities encourage students placed into low groups to become passive learners. To take but one variable, for example, frequent interruptions may encourage students to depend on others when they encounter difficulty rather than to think actively and attempt to solve problems themselves. Good (1981) has noted that during general discussion in some classrooms, lows have fewer opportunities to respond, but must answer more quickly when they are called on. If lows respond correctly, they are less likely than other students to be praised, and they are more likely to be criticized when they are incorrect. Furthermore, if they do not respond, lows are more likely to be given the answer by the teacher or someone else.

Although researchers are beginning to collect data that describe in detail what instruction is like for high and low reading-groups, several studies indicate that group placement is extremely important—that is, being placed into a higher reading group can have a significant, positive effect on achievement. Weinstein (1976) found that reading group membership contributed a significant increment of 25% to the prediction of achievement over and above initial readiness differences among children. Although the mediating effects of group membership were not identified in the Weinstein study, more recent studies (e.g., Eder, 1981) provide important clues about some of the ways in which group membership affects the academic performance of high and low students. It is becoming increasingly clear that differences in instruction of high and low reading-groups in many first-grade classrooms are likely to sustain the poor performance of slower students and to increase the disparity between the two groups.

Some Suggestions

We suspect that in many classes reading instruction delivered to low students should be altered; however, research has not documented successful ways for doing this. Still, there are many clues in the literature as to how teachers might proceed, and different individuals have offered suggestions for improving reading instruction. It is possible to offer suggestions but the effects of suggested changes upon students' attitudes and performance have not been tested in research.

Eder recommends that low students receive more individualized attention and instruction in first-grade reading groups and Allington (1983) argues that teachers need to treat all readers more similarly. In particular, he states that poor readers develop more slowly partly because they are treated differently than are readers who have more skills when they enter first grade. In other words, differential instruction increases what may be relatively minor differences among students at the beginning of first grade.

In addition to these suggestions, we believe that most low-achieving first-grade students would be better off receiving some instruction in somewhat more heterogeneous groups than they presently do. Mixed groups would probably present fewer managerial difficulties, and students could move more quickly through the curriculum and focus more on the meaning of the material being examined. More diverse grouping might be particularly useful if, in addition to a general reading session in the morning, students who have low readiness scores receive extra instruction and special sessions in the afternoon. Although the argument against ability group instruction in first-grade reading is not as strong as that against tracking (as argued in a previous section), research evidence is sufficient to question the value of ability grouping and to wonder if other formats for instruction might be more practical or effective.

Although it is possible to find a few studies that show that elementary students' achievement scores can be increased when students are assigned to higher ability groups (e.g., Dewar, 1963), research that includes systematic observation of instructional process as well as student achievement data has not shown a pattern of achievement gains associated with the assignment of students to ability groups, and, indeed, such research has raised questions about the adequacy of instruction that students placed into low groups receive. At the secondary level there are some data to suggest that high-ability students may obtain *slight* gains when they are in homogeneous classes and simultaneously receive an enriched curriculum. Again, however, examination of the instruction afforded low students taught in homogeneous groups (e.g., Metz, 1978) has raised serious questions about the efficacy of grouping.

Why Does Ability Grouping Not Work More Effectively?

According to Good and Stipek (1983), ability grouping within classrooms is the most common procedure used to accommodate individual differences in rates of learning. However, they note that there are difficulties posed by most such attempts to compensate for individual differences. Indeed, ability grouping apparently causes as many problems as it solves. The most common criticism of homogeneous ability grouping is that it stigmatizes children in lower groups, often causing them to develop negative self-concepts. Teachers tend to be less motivated to teach low-ability groups, and their expectations, behavior toward these children, and perceptions of students' performances and instructional needs may be largely determined by these students' placement in low groups. Evidence that group placement is highly stable over time suggests that ability grouping is less flexible than would be expected if children were all learning at an optimum rate.

Are More Varied Groups Less Teachable?

Much of the process–product research conducted in the late 1970s involved teachers who were instructing large groups of students because earlier naturalistic research had indicated that teachers who obtained the highest student achievement gains in mathematics used large-group formats. However, teachers who had the lowest achievement scores also used whole-class instructional techniques (Good, Grouws, & Ebmeier, 1983). Thus, despite many arguments that students need to be taught in instructional groups in order to achieve a better match between the content presented and the needs of individual learners, a number of studies conducted in the 1970s suggest that whole-class instruction is associated with more extreme effects on student achievement than individualized and group methods.

Indeed, in one program of research it was found in three different school districts that teachers who generally obtained the most extreme achievement effects (both positive and negative) taught students basically in large groups or in whole-class instruction (Good *et al.*, 1983). Because subsequent research focused upon extreme teachers (those who were getting the best or worst results), most of the process studies that followed examined how teachers who were relatively effective and ineffective using whole-group instruction varied in their behavior. Thus, we have little information about variation in teacher behavior within group and individualized instructional formats, in elementary schools.

The data collected by Good *et al.* (1983) in the Missouri Mathematics Program of research make it clear that some teachers obtain more achievement from students than others and that teachers can be taught behaviors and principles that improve their effectiveness in using whole-class–large-group teaching techniques (Good, *et al.*, 1983). We cite this evidence in the present chapter because we want to explore the relationship between class heterogeneity and achievement. One of the oft-cited virtues of ability grouping is that it allows teachers to reduce variance in learners' abilities so that the class is easier to instruct. It would seem, then, that teachers who use whole-class methods do so because the variance of learners' ability in their classes is less extreme than the variance in classes of teachers who use individualized or small-group techniques. However, in two different samples used to compare molar teaching orientations (whole class, individualized, small group), we found that the correlation between variation in student achievement and the selection of a whole-class–large-group teaching technique is very small but positive. That is, teachers in these samples had a slight tendency to use large-group teaching techniques when the variance in learners was greater.

Although teachers who group for instruction may be attempting to form groups of students with comparable instructional needs, the relationship between grouping practices and the variance in student ability suggests that many teachers do not group in order to accommodate more heterogeneous classes. Rather, the decision to group may be influenced by a number of other factors: information presented in teacher education programs, existing practices in a particular school, and the personal philosophy of a teacher.

Ebmeier recently reanalyzed data collected in the Missouri Mathematics Program (Ebmeier & Good, 1979; Good & Grouws, 1979) and correlated the variance in student ability that existed at the start of the year in each classroom with end-of-year residual achievement data. He found low but positive correlations between variance in student ability and mean residual achievement. That is, classrooms that showed the most achievement gain tended to begin the year with slightly *more* variation in student ability. One weakness of this analysis is that it utilized a linear model, and it is quite possible that there is an optimal level of variation. At some point variation may be so great as to impede student achievement. A second problem is that Ebmeier's reanalysis concerned only general variation and achievement of many classrooms. As we noted earlier in this chapter, there are different types of classrooms that might be labelled *heterogeneous.*

Obviously, we do not believe that increased heterogeneity of learners is always associated with increases in achievement for all students. Too much heterogeneity may create instructional problems, and there are probably limits on the amount of class heterogeneity that a teacher can reasonably handle (although an important variable will be the number of extreme performers in the class). In practice, the most prevalent problem is that ability-group membership lines are too tightly drawn. Lows in general need more opportunity to learn with highs.

Good and Stipek (1983) note that homogeneous groups are *not* necessarily easier to teach than diverse ones. Tyler (1962) found that homogeneous grouping on a *single* ability measure did not reduce variance in students' other abilities. One danger of homogeneous ability grouping is that some teachers believe that students who have been grouped together will benefit from the same treatment. Good and Stipek contend that some teachers who instruct larger, more diverse classes may feel a stronger need to ascertain whether they have been understood by all students than if they taught homogeneous classes or groups of slow learners.

Furthermore, research on large-group instruction has shown that the ability to determine whether or not students have comprehended material is related to student achievement. Relatively ineffective teachers do not carefully monitor students' progress or their conceptual understanding of material (Good, 1982; Good *et al.*, 1983).

Summary

In this section we have examined studies of instruction in high- and low-ability groups within classrooms, especially reading groups. Research consistently shows that high students receive more active instruction, particularly instruction concerning the meaning of what is read. In contrast, teachers emphasize practice and skills when teaching low groups. Although the question of *appropriateness* is difficult to assess because data in these studies were correlational, we believe that research indicates that in many classrooms teachers err by holding expectations that are too low, by pacing instruction too slowly, and by ignoring or under-emphasizing the substantive aspects of tasks when instructing low groups. We believe that teachers' behavior towards low groups is influenced by their expectations for these pupils as well as the social difficulties that exist when many relatively immature students are taught at the same time (Eder, 1981).

Although studies reviewed in this section do not suggest that ability grouping within classrooms should be abandoned, they do show that dividing students into groups for instruction does not necessarily make instruction easier; in fact, slow students are often more difficult to instruct in groups. Teachers who group students by ability need to assess carefully their reasons for grouping and how adequately grouping enables them to meet instructional goals. Furthermore, teachers must periodically assess their behavior to be sure that students in the low group are receiving appropriate instruction.

Obviously, more research is needed, particularly experimental research that varies the composition of reading groups and assesses the effects of composition on student achievement and attitudes. We believe that teachers often overrespond to initial variance in learner's abilities and that some teachers rely upon grouping when teaching students with varied ability levels. We suspect that higher quality and more thoughtful teaching of mixed groups of learners can lead to better outcomes than can fragmented teaching of a number of different groups.

Composition Studies

Beckerman and Good (1981) studied the ratio of high- and low-achieving students in classrooms using a sample drawn from a large metropolitan school district that basically served a middle-class population in neighborhood schools. They defined classrooms with *more favorable* teaching situations as those in which more than a third of the students were high aptitude and less than a third were low aptitude. *Less favorable* classrooms were those in which less than a third of the students were high aptitude and more than a third were low aptitude.

Beckerman and Good found that both low- and high-aptitude students in favorable classrooms had higher achievement scores than the two groups in unfavorable classrooms. This effect was observed in both third- and fourth-grade classrooms, although the effect was not significant for high-aptitude, third-grade students. In this study, being in a classroom with many high-aptitude students was more beneficial than being in a low-aptitude classroom for low-aptitude students and some high-aptitude students.

Veldman and Sanford (1982) also found evidence that classroom composition might influence student achievement. They measured classroom composition in seventh and eighth grades in nine junior high schools by determining the mean achievement level for each class at the beginning of the year. Veldman and Sanford report that significant interaction effects were found, indicating that both high-and low-ability pupils do better in high-ability classes and that the effects of class ability are more pronounced with low-ability students. These results, although obtained with different methods, resulted in conclusions that were very similar to Beckerman and Good's. Veldman and Sanford also found that lower-ability students were more affected by group placement than highs. They argue that lower-ability students are more likely than highs to conform to the behavior of the majority of their classmates and that low-ability classes can be described as poor learning environments, which are frequently disrupted.

According to these researchers, changes in class composition or other context variables are unlikely to convert a very effective teacher into a totally ineffective one. Although composition is important, the *quality* of instruction is a crucial variable that also affects achievement. No doubt research will show quality of teaching, class ability-level, and variations in learners' ability in the classroom are interrelated.

Results of these studies challenge the simple suggestion that variability in student achievement levels within a class requires that students be grouped on the basis of ability. We do not believe that teachers should never group, for we feel that for certain students and for some academic goals grouping is appropriate. However, we do challenge the assumption that high- and low-achieving students must be taught separately.

Earlier we suggested that one way to alter the structural constraints of low reading-groups was to teach high- and low-reading students together for at least a short time each day. Furthermore, there is clinical evidence that putting a student into a higher group and altering instructional behavior can be associated with improved achievement.

For example, Shavelson (1982) reports that changing the textbook used in the low group from one that was one grade below level to a book that was grade level (and a book that looked more sophisticated), altering the instructional focus from teacher reading to student reading, and emphasizing the content of assignments rather than format were effective in increasing students' effort and performance in reading as well as their interest. Weinstein (1982) found that moving a student from a low to a higher reading-group was associated with an increase in expectations and performance that was quite dramatic. Although the findings of Weinstein and Shavelson are anecdotal, they clearly demonstrate that when processes within a group are changed, or when a student is moved from a low group to a higher one, some of the negative influences of low-group membership are either eliminated or reduced (at least temporarily). (See also, Eder & Felmlee, Chapter 11, this volume.) There is growing evidence that the ability level and motivation of other students present in a class or group affects the achievement of individual students.

Classroom Composition and Task Structure

Future researchers should carefully examine the relationships of composition variables to recently identified factors such as task structure and grouping practices. In this section, we discuss the potential effects of student composition on task structure in order to illustrate more fully how student characteristics can influence educational outcomes.

Bossert (1979) has studied the distinctive types of work organization that exist in classrooms and how they influence outcomes of schooling (achievement, friendship patterns, etc.). Bossert analyzes the conditions under which classroom tasks are carried out, and argues that task structure influences students' self-perceptions and achievement in important ways. He examines the influence of various structural dimensions (public vs. private evaluations; all students working on the same task vs. students working on different tasks and receiving evaluation related to the work; teacher-assignment of tasks vs. student selection; and many other variables). Some of the data suggest that specific task structures may encourage certain teacher and student perceptions and behaviors. This is important research, and it provides a method of exploring classroom work conditions that may influence classroom behavior. However, Bossert's data were collected in a laboratory school in which most of the students were reasonably bright and from fairly affluent homes. One wonders what influence the *relatively* homogeneous population of students had on his finding. The effects of an activity structure may vary according to the population of students in a class, and we suspect this variation is more problematic than Bossert's initial work suggests.

In a related study, Anderson and Scott (1978) found that diverse teaching strategies (group work, visual presentations, seatwork, class discussions, lectures) variously affected the attention of students with different aptitudes and self-concepts. A comparison of the two studies suggests that student styles, teacher styles, curriculum, and activity structure are all important dimensions of classrooms and that an exclusive focus on one dimension does not provide a complete picture of classrooms.

Task Structure: Another Perspective

Doyle (1979) advocates the examination of classroom tasks and activity structures because he believes that the two differ within some, and possibly many, classrooms.[1] Doyle contends that what students do in classrooms (and their perceptions of what they are doing and why) may sometimes be discrepant with the actual task that the teacher has in mind. That is, students sometimes even practice the wrong operations. For example, a teacher may spend much class time having students *diagram* sentences; however, the teacher might choose not to test whether students can apply this skill (e.g., on the test, students are required to *write* original sentences). In this case, from Doyle's perspective, having students practice diagramming sentences would be an activity and not a task since it was not functionally related to the intended outcome.

---

[1] From Doyle's perspective, a task consists of two elements: *(a)* a goal and *(b)* a set of operations necessary to achieve the goal. He argues that there are two consequences to accomplishing a task. First, the person develops information (e.g., facts and principles) and also the person will practice operations (e.g., memorizing and analyzing).

Doyle suggests the need to study broader relationships among classroom tasks and activities and points out that one can misinterpret classroom events if a process that occurs at one point in time is examined without a clear understanding of what *preceded* or what will *follow*.

As an explicit case in point, Doyle (1979) notes that teachers have been found to praise inappropriate student responses. Reasons for such teacher behaviors may be laudable (e.g., to encourage classroom participation); however, the discrepancy between stated teacher behavior (get thoughtful answers) and accepted behavior (wrong answers) may teach students that the real task is to respond quickly and not to think. Such discrepancies between activity and task demands may communicate low expectations for student learning. We agree with his contention; however, it is likely that certain teachers can teach their students to tolerate more risk than other teachers.

The studies by Bossert and Doyle are important steps toward integrating classroom environment (e.g., classroom structure) and molar curriculum variables (e.g., What is the real task for the student?). These perspectives will be better understood when they are applied in a variety of educational settings. We believe that Bossert's and Doyle's perspectives need to consider teaching quality as well. Numerous studies using diverse research methods show that teacher effects are quite prevalent. Recall that Goldberg *et al.* (1966) found that the teacher to whom a student was assigned was more important than a particular ability grouping pattern to which he or she was assigned. Research also demonstrates that students' perceptions of ability and activity structures within classrooms are related (Rosenholtz & Wilson, 1980), but there are also data that indicate that an individual teacher can mediate this effect (Rosenholtz and Rosenholtz, 1981).

Student composition variables have been poorly defined and seldom studied in any systematic way. The number of potential composition questions is vast and wide-ranging in scope, and much research conducted in the past could have profited from more consideration of student composition factors. To illustrate more fully the range of possible research questions in this area, we suggest that the assignment of students to a class (e.g., the composition of students in the class) may have direct effects on grouping practices within the classroom.

At present, in many American schools, because of declining student enrollment, students have to be grouped across grade levels in order to have enough students to justify hiring a teacher. In such cases, we suspect that grouping too often begins with an organizational or institutional need rather than a question about how best to serve the educational needs of students.

As a case in point, one of the authors had a chance to observe the effects of such decision making on the school lives of second- and third-grade students in a small school serving a diverse student population. There were enough second- and third-grade students to justify the formation of three classes (one mixed, one second grade, and one third grade). In this particular case, a decision was made to *form* the mixed class on the basis of student *maturity* (capacity to work independently) as opposed to *ability*.

The principal wanted mature third-and second-grade students in one classroom so that one group could work independently while the teacher worked with the other group. Had the principal formed classes according to ability there would have been more pressure on the teacher to use whole-class and large-group teaching. Had the principal used more dynamic individual characteristics (sociability–works well in groups), or stressed a more social outcome (learn to work well with others who are diverse), the teacher might have made greater attempts to have second- and third-grade students interact.

In this case, the independent worker model and the demand characteristics communicated to the teacher by such a grouping virtually guaranteed that the teacher would instruct the second- and third-grade students as separate, *intact* groups (no social or academic contact between groups) and that comparatively little social interaction could be allowed *within* groups because their group role was institutionalized as individual work.

This class contained 16 second- and third-grade students. The 4 third-grade girls appeared to be socially isolated, in part because of peer expectations (i.e., social interaction occurs with same-sex, same-age classmates and the teacher did little to alter this peer norm) and in part because the girls were from diverse backgrounds.

This example clearly illustrates the need to study a variety of variables if classroom life is to be understood more fully. It is likely that the principal's decision about how to *assign* students was influenced to some extent by perception of the teacher's style and ability. No doubt, the teacher's classroom strategies were influenced *by* both the composition of students as well as the assumptions and expectations about the principal's motivation in assigning students for instruction in this way. A different teacher and another four girls would, we believe, have led to different consequences.

Historically, educational research has made too much ado about too few variables. Teacher effects are real, as are student variables, structural settings, curriculum tasks, student composition factors, as well as school effects. And all of these variables are relevant to the question, Do students learn more in heterogeneous or homogeneous settings? And it is because of this complexity that composition variables have to be considered along with quality of teaching (e.g., Good, 1982), task structure of the classroom environment (e.g., Bossert, 1979), and task demands of assigned work (e.g., Doyle, 1979).

Acknowledgments

This paper was typed at the Center for Research in Social Behavior at the University of Missouri-Columbia. We gratefully acknowledge this technical assistance, especially the skillful typing services of Janice Meiburger and Patricia Shanks. Also, the authors gratefully acknowledge the extensive and valuable editing provided by Gail Hinkel and want to thank Jere Brophy, Maureen Hallinan, Penny Peterson, Aage Sørensen and Louise Cherry Wilkinson for their comments on the paper.

References

Allington, R. Teacher interruption behaviors during primary grade oral reading. *Journal of Educational Psychology*, 1980, *73*, 371–377.

Allington, R. The reading instruction provided readers of differing reading ability. *Elementary School Journal*, 1983, *83*, 548–559.

Alpert, J. L. Teacher behavior across ability groups: A consideration of the mediation of Pygmalion effects. *Journal of Educational Psychology*, 1974, *66*,(3), 348–353.

Anderson, L., & Scott, C. The relationship among teaching methods, student characteristics, and student involvement in learning. *Journal of Teacher Education*, 1978, *29*, 52–57.

Beckerman, T., & Good, T. The classroom ratio of high- and low- aptitude students and its effect on achievement. *American Educational Research Journal*, 1981, *18*, 317–327.

Bossert, S. *Task and social relationships in classrooms: A study of classroom organization and its consequences.* (American Sociological Association, Arnold and Caroline Rose Monograph Series). New York: Cambridge University Press, 1979.

Dewar, J. Grouping for arithmetic instruction in sixth grade. *Elementary School Journal*, 1963, *63*, 266–269.

Doyle, W. Classroom task and students' abilities. In P. Peterson & H. Walberg (Eds.), *Research on teaching: Concepts, findings, and implications.* Berkeley, California: McCutchean, 1979.

Drews, E. *The effects of heterogeneous and homogeneous grouping upon children of three ability levels in ninth-grade English classes.* A report to the Lansing, Michigan Public Schools, 1962.

Ebmeier, H., & Good, T. The effects of instructing teachers about good teaching on the mathematics achievement of fourth grade students. *American Educational Research Journal*, 1979, *16*, 1–16.

Eder, D. Ability grouping as a self-fulfilling prophecy: Micro-analysis of teacher–student interaction. *Sociology of Education*, 1981, *54*, 151–161.

Esposito, D. Homogeneous and heterogeneous ability grouping: Principle findings and implications for evaluating and designing more effective educational environments. *Review of Educational Research*, 1973, *43*, 163–179.

Evertson, C. Differences in instructional activities in average- and low-achieving junior high English and math classes. *Elementary School Journal*, 1982, *82*, 329–350.

Goldberg, M., Passow, A., & Justman, J. *The effects of ability grouping.* New York: Teachers College Press, 1966.

Good, T. Teacher expectations and student perceptions: A decade of research. *Educational Leadership*, 1981, *38*, 415–421.

Good, T. Classroom research: What we know and what we need to know (Tech. Rep. 9018). Austin, Texas: Research and Development Center for Teacher Education, 1982.

Good, T., & Grouws, D. The Missouri mathematics effectiveness project: An experimental study in fourth grade classrooms. *Journal of Educational Psychology*, 1979, *71*, 355–362.

Good, T., Grouws, D., & Ebmeier, H. *Active mathematics teaching: Empirical research in elementary and secondary classrooms.* New York: Longman, 1983.

Good, T., & Stipek, D. Individual differences in the Classroom: A psychological perspective. In M. Fernstermacher & J. Goodlad (Eds.), *1983 NSSE Yearbook*, 1983.

Hargreaves, D. *Social relations in a secondary school.* London: Routledge & Kegan Paul, 1967.

Heathers, G. *Organizing schools through the dual progress plan.* Danville, Illinois: Interstate, 1967.

Keddie, N. Classroom knowledge. In M. Young (Ed.), *Knowledge and control: New directions for the sociology of education.* London: Collier MacMillan, 1971.

Kulik, C., & Kulik, J. Effects of ability grouping on secondary school students: A meta analysis of evaluation findings. *Review of Educational Research*, 1982, *19*, 415–428.

Leacock, E. *Teaching and learning in city schools.* New York: Basic Books, 1969.

McDermott, R. *Kids make sense: An ethnographic account of the interactional management of success and failure in one first-grade classroom.* Unpublished doctoral dissertation, Stanford University, 1976.

Metz, M. *Classrooms and corridors: The crisis of authority in desegregated secondary schools.* Berkeley, California: University of California Press, 1978.

Persell, C. *Education and inequality: The roots and results of stratification in America's schools.* New York: The Free Press, 1977.

Rosenbaum, J. *Making inequality: The hidden curriculum of high school tracking.* New York: Wiley, 1976.

Rosenholtz, S., & Rosenholtz, S. Classroom organization and the perception of ability. *Sociology of Education,* 1981, *54,* 132–140.

Rosenholtz, S., & Wilson, B. The effect of classroom structure on shared perceptions of ability. *American Educational Research Journal,* 1980, *17,* 75–82.

Schwartz, F. Supporting or subverting learning: Peer group patterns in four tracked schools. *Anthropology and Education Quarterly,* 1981, *12,* 99–121.

Shavelson, R. *One psychologist's (not very representative) view of teachers' decisions about grouping students: Alis status.* A paper presented at the Annual Meeting of the American Educational Research Association, New York, 1982.

Tyler, F. Intra-individual variability. In N. Henry (Ed.), *The sixty-first yearbook of the National Society for the study of education,* (Part 1). Chicago: University of Chicago Press, 1962.

Veldman, D., & Sanford, J. The influence of class ability level on student achievement and classroom behavior (Tech. Rep.). Austin, Texas: Research and Development Center for Teacher Education, 1982.

Webb, N. *Predicting learning from student interaction: Defining the variables.* Paper presented at the Annual Meeting of the American Educational Research Association, New York City, 1982.

Weinstein, R. Reading group membership in first grade: Teacher behaviors and pupil experience over time. *Journal of Educational Psychology,* 1976, *68,* 103–116.

Weinstein, R. *Expectations in the classrooms: The student perspective.* Paper presented at the Annual Meeting of the American Educational Research Association, New York City, 1982.

Grouping and Instructional Organization*

STEVEN T. BOSSERT,
BRUCE G. BARNETT,
AND NIKOLA N. FILBY

Introduction

During the last two decades, a growing body of research has demonstrated the importance of instructional grouping practices. This work has made it increasingly clear that class composition, tracking, and reading group assignment affect children's academic performance as well as their self-perceptions and social development. Until recently, however, this research has focused on between-classroom variations rather than on within-classroom groupings. With the growing number of studies showing that many children, particularly those in the elementary grades, engage in a variety of lesson and activity formats involving different groupings, we need to know more about how students' experiences vary from group to group and how this may affect their learning.

In this chapter, we argue that most studies have adopted a static, mechanistic view of grouping processes. They have focused on describing how students in classes with different compositions or in different instructional groups within a classroom are treated by the teacher or by their peers. Although this approach has provided useful information about the allocative processes among classes and instructional groups, particularly in terms of students' access to important material and human resources, it provides a limited picture of the effects of instructional organization on teachers and students. We contend that a more dynamic view of grouping is needed—one that considers the interaction between task and group structures. If grouping is a coordinative mechanism by which teachers organize students for specific tasks, then the *linkage* between group

*Work on this paper was supported in part by the National Institute of Education, Department of Education, under Contract No. 400-80-0103. The contents of this paper do not necessarily reflect the views or policies of the Department of Education or the National Institute of Education.

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-552220-7

assignment, resource allocation, and task characteristics becomes a critical variable in typifying differences in grouping structures and in understanding their effects on children's learning and social development. In outlining this dynamic perspective, we suggest areas where additional research is needed.

Grouping as a Coordinative Mechanism

Many teachers use a variety of groupings for different purposes. Groups often are constituted for instruction, control, socialization, and administrative tasks. The literature for teachers typically presents a dynamic view of grouping structure, recommending that teachers match teaching objectives, student learning styles, and classroom management or instructional methods (e.g., mastery learning). And descriptions of instructional grouping patterns demonstrate that teachers use a variety of groups for specific instructional purposes (e.g., Bossert & Barnett, 1981). Unfortunately, grouping studies usually analyze groups that are constituted for only one purpose (e.g., reading instruction) and rarely describe the relationships among groups, tasks, and instructional contexts within the classroom.

From an organizational perspective, the importance of grouping is clear: Work groups are organized in order to coordinate production processes. Task and group characteristics are independent, but importantly related, factors that affect productivity and managerial effectiveness. The relationship between the task demands and the size and composition of the work groups shapes the nature of resource allocation and work assignments within any organization (Thompson, 1967). Groupings are inextricably linked to the division of labor within the organization. Ideally, the complexity of the production process, defined by the degree to which task demands are mutually contingent, determines the degree to which work roles and functions are interdependent (e.g., Stinchcombe, 1959; Woodward, 1965). Under mechanical forms of work, where all workers are working independently on the same task at the same time, roles are segmented and management functions rely on direct control of the workflow, typically through rule-setting and direct supervision. Work groupings are shaped more by physical and managerial concerns than by task demands. By contrast, when work roles are strongly linked to the task demands of production (in organic forms of work organization), workers typically are more interdependent and are granted more autonomy. Groups that facilitate the accomplishment of tasks evolve from the production process, rather than from other concerns.

The effects of different groupings on productivity and social relationships are well documented in industrial settings (Miller & Hamblin, 1963; Sayles, 1958). Efficient organizations structure work and managerial functions according to the characteristic workflows demanded by their basic production processes (tasks and technology). In Thompson's (1967) terminology these are *buffering* nonproduction factors. When the work structure supports task requirements, managerial and social relationships among workers are solidary and unmarred by hostile cleavages. When task and production factors do not determine the work organization, an organization becomes less efficient and subject to divisive social relationships, both between managers and workers and among workers (e.g., Blau, 1965).

A similar analysis can be applied to classrooms. Bidwell and Kasarda (1980) have described the importance of the division of teacher and student labor within classrooms. They conceptualize schooling processes as a sequence of decisions and consequent actions by the teacher and student work-group members about the use of work-group resources (Bidwell and Kasarda, 1980). For example, when all students are performing the same task during the same period (which they define as a *mechanical* division of labor) the distribution and use of resources are largely controlled by the teacher's actions as she or he delivers information, materials, and assistance within the classroom. Under more *organic* forms of labor (where students are engaged in a variety of different tasks) the availability and use of resources are more in the control of the students. It follows from Bidwell and Kasarda's formulation that when mechanical forms of instruction are used, students' achievements are more vulnerable to differential allocations by the teacher and to ineffective instructional techniques than when organic forms are employed. (This is consistent with findings from ability grouping and high–low studies to be reviewed here subsequently.)

Classroom Grouping Structures

Bidwell and Kasarda's (1980) formulation focuses on classroom-to-classroom variations in task complexity. However, when within-classroom groupings are considered along with the way in which student labor is divided, we can begin to build a somewhat complex, but more accurate model of instructional organization. The division of labor and its effects on students can be considered in relation to what happens within any instructional group as well as to the nature of the overall grouping structure of the classroom.

Typical classroom groupings can be seen to lie on the continuum from mechanistic to organic—the most mechanistic instructional organization occurring when student roles are undifferentiated and independent, and the most organic occurring when students have specialized roles and work interdependently to accomplish the task. An example of a mechanical group structure is when all students are working independently on the same worksheet. A more organic organization is often seen when students work collaboratively on a task and when group reward structures are present, such as in the jigsaw approach (Aronson, Blaney, Stethan, Sikes, & Snapp, 1978), in teams–games–tournament (Slavin, 1977), and in treatments that derive from expectation states theory (Cohen, this volume; Cohen & Anthony, 1982; Rosenholtz & Wilson, 1980).

Table 1 categorizes typical classroom instructional activities along the two most salient dimensions of their work organization—task interdependence and task differ-

TABLE 1
Activity Configurations

Task Interdependence	Task Differentiation		
	None	Between Groups	Within Groups
Independent	(1) Whole-class worksheet	(2) Separate reading groups	(3) Separate individualized program
Interactive	(4) Whole class with cooperation	(5) Separate reading groups with cooperative tasks	(6) Common individualized program
Interdependent	(7) Common group projects	(8) Group product	(9) Coordinative group task

entiation. Three common states typify task interdependence: (*a*) Children can work independently on projects; (*b*) they can work cooperatively but complete separate tasks; (*c*) or they can work interdependently, each contributing a unique portion of the activity. Moreover, all of the children can work on the same task (*no differentiation*). Different groups can have different tasks (*between-group differentiation*). Or children within groups can have different tasks (*within-group differentiation*).

Taken together, these two dimensions describe common classroom activities. The following examples illustrate the cells in Table 1:

1. A common worksheet for a class, where students must work alone and are graded individually
2. Reading groups with different textbooks, but where students within each group complete identical assignments individually
3. Individualized program where all students are expected to complete the same assignments independently but at different rates
4. Whole-class recitation, or a common worksheet where students are allowed to interact but where each child completes a separate worksheet
5. Reading groups with different textbooks, where students can interact while completing their separate but identical assignments
6. Individualized program where students may work together on assignments, but each child must produce a separate product
7. Small groups or the entire class work on a common assignment, individual products are not demanded
8. Different groups within a class do different assignments, a group product, not individual products, is required; and
9. Different roles (either within small groups or the entire class) for students which require coordination to produce the joint product.

The instructional organization of a single grouping strategy, then, can be typified in terms of its work organization, varying from mechanistic to organic. The more interdependent and differentiated tasks constitute the more organic instructional activities. Under mechanical forms of instruction, such as whole-class worksheets and recitation, we would expect to find student attention and achievement more dependent on teacher actions, and hence, more subject to variations in the amount and appropriateness of instruction, than under organic forms. For example, the effect of interruptions on student time-on-task and curriculum pacing would be more acute in mechanical forms than in organic forms of grouping because the progression of the lesson depends on the teacher.

Under organic forms, such as cooperative group tasks and independent learning centers, student attention may be more transitory, but overall task productivity should be high across all achievement levels because of higher overall task engagement and less transition or waiting time. These predictions are consistent with many of the findings reported in grouping studies (as we describe here subsequently).

More important than categorization of the form of any specific instructional activity, however, is consideration of the overall grouping structure. The configuration of the various groupings used in a classroom also can be seen as having a more or less mechanical organization, depending on the relationship between task and grouping characteristics. In more mechanical structures, groups and tasks are uncoupled. That is, children are assigned to groups by criteria that are not definitely linked to the performance of the task or activity that takes place within the group. For example, when reading ability is used to construct groups not only for reading instruction but also for all other subject areas, a mechanical grouping structure is present. By contrast, the nature of the work itself shapes the selection of the group (and its internal organization) in more organic grouping structures. The true multitask structure, described by Bossert (1979), is an example of a grouping arrangement that is organic in nature, for it tends to combine multiple criteria (such as student interest and capabilities) in the formation of groups and facilitates fluid and interdependent work interactions within the group.

Although an exhaustive typology must rest on clear empirical work, three configurations seem apparent. A *unitary* form, where students experience the same type of mechanical activities throughout the curriculum, seems typical, particularly at the secondary level. For example, under this mode a teacher might use whole-class lecture-discussion activities, combined with individual tests, for all instruction, irrespective of the content and learning goals. A *sequential* form is perhaps the most common at the elementary level, where teachers use different activities (some mechanical and some organic) for each area of the curriculum. For example, when small, ability-based groupings are used for reading, whole-class recitations and worksheets for math, and cooperative work-groups for social studies typify this pattern. A *multidimensional* form occurs when teachers employ the more organic activities and link the type of task being accomplished to the type of activity used. A prototype of this arrangement would include multiple learning centers combined with individual and group instruction, all of which would be tied to functional task groups and student needs.

In analyzing the configuration of groupings used in a classroom, questions concerning the effects of different patterns of teacher and student behavior naturally arise. With regard to teacher management activities, one might hypothesize that under more mechanical grouping structures the teacher must not only manage the workflow within each of the groups (by providing appropriate material and human resources for the children to complete the task or activity), but she or he must also coordinate the workflow across groups. For example, when using small, ability-based groups, the teacher must maintain task engagement of all groups simultaneously. Anything that breaks attention in one group, such as misbehavior or students completing the task, tends to affect the task engagement of other groups as well. This often is seen in "ripple effects" (Bossert, 1977; Kounin, 1970) and high levels of unproductive transition time and waiting.

In organic grouping structures, the teacher's main task is to provide a variety of opportunities for children to form groups and to supply the materials and assistance necessary for completion of the activities. Because the task demands inherent in any one group's activity determine the way in which children organize and accomplish the task and the time necessary for its completion, the teacher need not control the workflow within groups or among groups directly. For example, in a multitask situation, it is possible for teachers to work with a child or single group without interruptions because the other children have numerous task options and need not check with the teacher for instructions when one activity is finished.

We do not mean to suggest, however, that one configuration is necessarily more effective than another, but simply that the demands for effective classroom management are different and stem from the instructional organization, not simply from the immediate task characteristics (see Filby, Barnett, & Bossert, 1982).

The effect of the configuration of groupings on students can be easily described. Under more mechanical organizations, students may be locked into groups that may not allow them to develop their competencies fully. This can occur by limiting opportunities for children to acquire and demonstrate their competencies (Bossert, 1981) or by providing treatment inappropriate for their learning needs. A clear example of this is apparent in Rist's (1970) description of elementary classrooms where social class criteria and initial reading-group placement limited children's opportunities to learn and to develop socially relevant skills. Moreover, because the teacher controls the workflow among tasks, children who complete a task before others often must wait until the group is finished. It is not uncommon to see three or four children waiting to check answers before they are allowed to go on to a new task in classrooms that use this mode. This lowers group efficiency, depressing pupil achievements and creating dependent participation styles that may limit subsequent self-directed learning (Good & Power, 1979; Ward, Tikunoff, & Mergendoller, 1980). To reiterate a point made by Bidwell and Kasarda (1980), student learning is vulnerable to differential resource allocations in mechanical organizations because students cannot substantially control their own involvement in the workflow (except their attentiveness).

In more organic structures, students' learning needs and motivations are naturally linked to the tasks and activities that they encounter throughout the school day, week, and year. For example, a true competency-based curriculum would entail an organic grouping structure, in that the groupings formed for instruction would be based on the nature of the competency to be acquired and the most efficient method for teaching that competency. Moreover, Bossert (1979) found that children in classrooms with a high proportion of multitask activities developed strong cooperative norms and were very self-directed learners. Unfortunately, because truly organic structures are not common and have not been widely studied, we know little about the other learning and social development outcomes associated with students' experience in these structures.

Grouping Studies and the Configurational Perspective

This perspective on the nature of configurational differences among grouping structures can help us analyze our knowledge concerning grouping effects. By examining the types of activities and configurations already studied, we can begin to compare results of various studies and see the extent to which instructional processes and outcomes are shaped by different configurational factors. Moreover, such an analysis points out the ambiguity of the term *grouping*.

Perhaps the most common comparisons among grouping arrangements examine the differences between classes where teachers use whole-class instruction and classes where teachers use small groups or individualized instruction. Essentially, these studies focus on the task differentiation dimension, comparing and contrasting only the most mechanical grouping structures ([1] & [2], Table 1). Although a variety of studies report somewhat conflicting results, it seems generally clear that students in small groups receive more individualized assistance, more positive feedback, and are exposed to a wider variety of materials than students who receive instruction in large groups (McDonald & Elias, 1976; Monk, 1981; Morrison, 1968; Peterson, 1981; Stallings, 1975). In examining the progress and participation of different types of students, for example, Peterson (1981) reports that high and low achievers retained more information when instruction occurred in small-group formats and participated more frequently in the lesson than similar students in large-group settings.

These findings are consistent with the configurational perspective on the effects of mechanical grouping structures. In whole-class instruction, where tasks are independent and no differentiation occurs, a teacher must control the workflow in relation to a diverse group and cannot tailor tasks to every child's learning needs. The teacher may choose a task and work pace that meets most students' minimal needs for task accomplishment, as Dahloff (1971) documents. However, this leads to marked inefficiencies in instruction when the achievement composition of the classroom is too diverse. High-performing children must wait or be given new assignments (often leading to a more organic structure—activities in [2], [4], or [5], Table 1). And poor performers may never receive the special assistance or time needed for them to accomplish the task. Therefore, the natural force of differences in student abilities pushes many teachers to more organic forms of instruction, minimally to groups that proceed at different paces (Barr, 1980). Teachers who fail to match groups with task demands and remain in whole-group instruction are inefficient in producing student achievement (Monk, 1981).

We might think that a more organic structure is formed when small groups (or individualized instruction) are used because of the opportunity for task differentiation among groups. However, grouping in itself does not guarantee the benefits of organic work forms. For example, if students are divided into reading groups based on ability, but are provided with the same instruction (described in [2], Table 1), management tasks, such as minimizing transition time, maintaining student attention, and providing timely feedback to students' questions, become more problematic without any necessary learning benefit for students. In this case, the positive effects of material differentiation that may result from grouping are attenuated by inefficient and inappropriate instructional methods. By contrast, a teacher may use whole-class lessons for basic skills instruction and use small, ad hoc groups with different task assignments to supplement this instruction (e.g., Evertson, 1982), thus creating a sequential format. From a configurational perspective, this latter organization is more organic than the former. And we would expect higher levels of on-task behavior and more learning when task goals and groups are linked. Most studies, however, have not provided enough information to fully evaluate patterns of instruction, and this could explain the apparent contradictions between findings that favor small-group instruction and those supporting whole-class direct instruction. It seems likely that these studies have studied different facets of the same configuration—one that has a fairly mechanical, serial structure. Hence, differences among classrooms of this type should be attributable to differences in teacher effectiveness, not to structural properties inherent in different instructional formats.

Therefore, studies of *supposedly* different classroom instructional processes leave us somewhat unclear about how various linkages among grouping, resource, and task structures affect teaching and learning. Because most of the research on grouping has examined only one subject matter and primarily mechanical activities (those in [1] & [2], Table 1), reported differences among instructional patterns may not represent true configurational differences among classes. Recent studies of activity structures have shown that many teachers use a variety of groupings and lesson formats during a subject and during the school day (Bossert, 1979; Harnischfeger & Wiley, 1978; Stodolsky, Ferguson, & Wimpelberg, 1981). Again, a configurational perspective hypothesizes that classrooms in which groups were stable and based on a single criterion (e.g., reading ability)—a unitary format—would involve different management strategies for teachers and produce different learning outcomes for students than classrooms in which groupings were related to the goals and task demands of different subject areas. (A similar argument could be made about tracking at the secondary level, but we do not address this here.) Therefore, we need to examine the nature and effects of within-classroom grouping.

High–Low Studies

When researchers have examined within-classroom grouping patterns and their effects, most have compared children's experiences in high and low reading-groups. Again this type of study seems to compare two different groupings within one configuration, typically a mechanistic, unitary format that employs activities only in the upper left corner of Table 1. Perhaps the best known study is Rist's (1970) examination of reading-group placement in an elementary school. He showed that initial assignment to reading groups was based on social class criteria applied by the kindergarten teacher and that reading groups provided the context for differential treatment by the teacher, which led to different opportunities to learn.

Following this theme (that within-classroom ability groups provide the vehicle for fulfilling teacher expectations) several other studies have documented differential treatment of students in different reading-groups. McDermott (1978) reports that students in the high reading-group received more time in reading and fewer interruptions to their instruction than did students in the low group. Hunter (1978) found that five of seven second-grade classes she studied provided more reading time for the high groups. Likewise, Allington (1980) indicates that oral-reading errors in low reading-groups were corrected more frequently than errors by highs and that teacher prompts to lows during oral reading focused on phonics.

Stern and Shavelson (1981) report that low-ability reading-groups were given more phonics, decoding, and basic comprehension tasks than high groups and that instruction was more highly structured for the low groups. In a study of first grade reading groups, Eder (1981 and this volume) found that children in lower reading-groups were frequently inattentive. This group was more controlled and had more reading-turn interruptions than students in the higher group. Eder suggests that these practices resulted in lower reading-test performances and lower oral-reading grades for the low-ability group.

These studies indicate that children in low-ability groups receive less time in instruction, poorer quality time (more interruptions), and fewer opportunities to develop competencies needed for achievement. However, it is unclear whether these differences are inherently associated with the use of ability-based groups or they simply reflect differences in teacher expectations and comparatively poor-quality teaching to the lower groups.

From a configurational perspective, allocative differences that inhibit task involvement and performance stem from inefficient management techniques associated with more mechanical grouping structures. When an organic organization is present, allocative differences may still exist, but they do not depress student productivity because differential allocations are appropriately linked to differences in task demands. Unfortunately, most studies of this type may only compare mechanical activities (from [2] & [5], Table 1) and seldom present any indication of how groups are established or how membership may change over time. Therefore, we do not know the extent to which outcome differences are attributable to poor instructional management, inequitable differential-allocation procedures, or ineffective grouping configurations.

However, several studies hint that when groupings and tasks are highly linked, student productivity remains high and differential allocations do not hinder achievement (e.g., Evertson, 1982). In our study of seven elementary classrooms, we found that low-ability groups often are paced as fast as or faster than high groups and that success rates on written work are comparable across groups (see Filby et al., 1982). Information was collected so that a detailed analysis of instructional events could be made both within each group and across groups over time. Therefore, we can assess the nature of the overall grouping structure. A preliminary examination of these data indicates that the teachers in our sample (identified as successful teachers) employ subtle differences in the sequencing of common instructional methods in such a way as to produce high levels of involvement and success among all groups of students. In other words, they match instructional management actions with the type of grouping employed. For example, in whole-class instruction and other mechanistic formats, the teachers seem to reduce off-task and waiting time by rapidly moving through short segments of instruction, thereby synchronizing the workflow among various groups.

Unfortunately, the comparison of high and low groups provides only a single frame of a child's classroom experiences. As mentioned before, many teachers appear to use a variety of groups for different activities and lessons. Little is known about the experiential differences that these changes provide for children.

A notable exception is Weinstein's (1976) study of three first-grade classes. When she compared differences in teacher–pupil interaction, Weinstein found few differences both across ability-based reading-groups and among children of different abilities when whole-class instruction was used. In whole-class instruction, low-ability children were offered more opportunities to read and given more praise than other students, and this was also true during small reading-groups. Yet, reading-group assignment was strongly associated with students' achievement gains. Unfortunately, Weinstein did not study the instructional task demands in these classrooms. It seems probable that the teaching methods used in the small groups she studied were identical to those used during whole-class instruction—giving the classrooms a very mechanistic structure. If so, Weinstein's results would be consistent with those anticipated for this type of grouping organization: when groupings and task–activity demands are not linked, clear differences in productivity among groupings cannot be associated with the instructional technology. If a more organic configuration were present, we might expect to find a stronger link between the instructional tasks and learning.

However, this conclusion cannot be overdrawn. To date, grouping studies have not examined a full range of instructional processes when describing differences in teaching methods used in small groups. Time allocations and pacing typify only the quantitative differences in the application of various instructional methods, but the qualitative differences among methods remain relatively unexplored. For example, we know little about possible group-to-group variations in terms of task demands required for performance (Doyle, 1979) or in terms of the nature of reward structures employed (Rosenholtz & Wilson, 1980; Slavin, 1977). We recommend that more systematic investigations of these and other factors be conducted in order to analyze not only the processes characteristic of any one group within the classroom, but also the sequencing of task demands and reward structures among the various groupings in the classroom. Otherwise, studies may simply examine one dimension of grouping, either task differentiation or task interdependence, and not consider the joint effects of these on instruction.

Linking Instructional Organization and Grouping

Fortunately, several new studies are beginning to indicate that different configurations of instructional activities and grouping have strong effects. First, the necessary linkage between grouping and reward structures is apparent in the works of Rosenholtz, Cohen, and their colleagues (Cohen & Anthony, 1982; Rosenholtz, 1982). In order to establish a multidimensional performance structure, classrooms are organized around various learning centers and students are given considerable authority in accomplishing their work. The more fluid, interdependent, and supportive peer structures that result, as well as the increases in student achievement associated with such treatments, indicate that more organic work structures increase productivity and facilitate positive social relations.

Second, a study by Rothenberg (1982) shows that organic classroom work-structures create positive peer relations that are unmarked by cleavages and static status hierarchies. Analyzing the percentage of multitask activities used by teachers in eight elementary classrooms, Rothenberg finds that classroom structure predicts the strength of the association between sociometric choices and actual peer interactions. In classes with a high proportion of multitask activities (greater than 38%), the status structure closely matches actual work and play interactions. Whereas in classrooms that use a high proportion of recitation and common worksheet assignments, there are clear sociometric stars who interacted with only a small group of peers—mostly from their own high-performing reading-group. The classroom activity and grouping structures seem to determine the way in which peer influence operates.

Third, our own studies of grouping have collected information on each teacher's goals for several lessons, actual teacher–pupil and peer interactions during the lessons, and interviews immediately following the lessons with the teachers and target children about their understandings of what occurred. These data, along with detailed observations on a comprehensive sample of all lessons, will allow us to examine the degree to which various groupings that teachers employ are linked to specific objectives and work structures and how these structures affect student participation and achievement.

Taken together, these studies are only beginning to tap important configurational differences in grouping structures. From the work reviewed here, it is clear that simple typologies that consider only the composition and number of groups operating do not adequately characterize differences in grouping organization. Also to be studied are the relationships among the size, the composition, the task demands, and the work roles, both within and among instructional groupings. Simply stated, a configurational perspective would predict that when these relationships are weak (when groups do not stem from basic aspects of the instructional task or technology) teacher management activities are inefficient and student learning is sensitive to fluctuations and resource allocations. When more organic structures are present, differences in the distribution of human and material resources are appropriately linked to task or activity requirements so that teacher and student productivity are maximized. However, regardless of the overall configurational effects, each instructional organization has appropriate management actions that facilitate student involvement and learning. When these are not used, marked inefficiencies in instruction and differences in student learning occur.

References

Allington, R. L. Teacher interruption behaviors during primary-grade oral reading. *Journal of Educational Psychology*, 1980, *72*, 371–377.

Aronson, E., Blaney, N., Stethan, C., Sikes, J., & Snapp, M. *The jigsaw classroom*. Beverly Hills, California: Sage, 1978.

Barr, R. *The productivity of multilevel educational organizations*. Paper presented at the meetings of the American Educational Research Association, Boston, 1980.

Blau, P. *The dynamics of bureaucracy*. Chicago: University of Chicago Press, 1965.

Bidwell, C., & Kasarda, J. Conceptualizing and measuring the effects of schools and schooling. *American Journal of Education*, 1980, *88*, 401–430.

Bossert, S. Tasks, group management, and teacher control behavior: A study of classroom organization and teacher style. *School Review*, 1977, *85*, 552–565.

Bossert, S. *Tasks and social relationships in classrooms*. New York: Cambridge University Press, 1979.

Bossert, S. Understanding sex differences in children's classroom experiences. *The Elementary School Journal*, 1981, *81*, 254–266.

Bossert, S., & Barnett, B. *Grouping for instruction*. San Francisco: Far West Laboratory for Educational Research and Development, 1981.

Cohen, E. G., & Anthony, B. *Expectations states theory and classroom learning*. Paper presented at the meetings of the American Educational Research Association, New York, 1982.

Dahloff, U. *Ability grouping, content validity, and curriculum process analysis*. New York: Teachers College Press, 1971.

Doyle, W. *The tasks of teaching and learning in classrooms* (Rep. No. 4103). Denton, Texas: North Texas State University, 1979.

Eder, D. Ability grouping as a self-fulfilling prophecy: A micro-analysis of teacher-student interactions. *Sociology of Education*, 1981, *54*, 151–162.

Evertson, C. *Managing instruction for different class compositions.* Paper presented at the meetings of the American Educational Research Association, New York, 1982.

Filby, N., Barnett, B., & Bossert, S. *Grouping practices and their consequences.* San Francisco: Far West Laboratory for Educational Research and Development, 1982.

Good, T., & Power, C. Designing successful classroom environments for different types of students. *Curriculum Studies*, 1979, *8*, 45–60.

Harnischfeger, A., & Wiley, D. E. *Determinants of pupil opportunity.* Chicago: University of Chicago Educational Finance and Productivity Center, 1978.

Hunter, D. *Student on task behavior during reading group meeting.* Unpublished dissertation, University of Missouri, Columbia, Missouri, 1978.

Kounin, J. *Discipline and group management in classrooms.* New York: Holt, Rinehart & Winston, 1970.

McDermott, R. P. Relating and learning: An analysis of two classroom reading groups. In R. Shuy (Ed.), *Linguistics and reading.* Rawley, Massachusetts: Newbury House, 1978.

McDonald, F. J., & Elias, P. *Beginning teacher evaluation study: Phase ii* (Final Rep. Vol. 1). Princeton, New Jersey: Educational Testing Service, 1976.

Miller, L. K., & Hamblin, R. E. Interdependence, differential rewarding, and productivity. *American Sociological Review*, 1963, *28*, 168–178.

Monk, D. H. Toward a multilevel prospective on the allocation of educational resources. *Review of Educational Research*, 1981, *51*, 215–236.

Morrison, V. B. Teacher-pupil interaction in three types of elementary classroom reading situations. *The Reading Teacher*, 1968, *22*, 271–275.

Peterson, P. L. *Student diversity and student achievement in large-group and small-group approaches.* Paper presented at the meetings of the American Educational Research Association, Los Angeles, 1981.

Rist, R. C. Student social class and teacher expectations. *Harvard Educational Review*, 1970, *40*, 411–451.

Rosenholtz, S. Treating problems of academic status. In J. Berger & M. Zelditch, Jr. (Eds.), *Status, attributions, and justice.* New York: Elsevier, 1982.

Rosenholtz, S., & Wilson, B. The effects of classroom structure on shared perceptions of ability. *American Educational Research Journal*, 1980, *17*, 175–182.

Rothenberg, J. *Peer relations and activity structures in elementary school classrooms.* Unpublished dissertation, University of Michigan, Ann Arbor, 1982.

Sayles, L. R. *Behavior of industrial work groups.* New York: Wiley, 1958.

Slavin, R. E. Classroom reward structures: An analytic and practical review. *Review of Educational Research*, 1977, *47*, 633–650.

Stallings, J. Implementation and child effects of teaching practices in follow through classrooms. In *Monographs of the Society for Research in Child Development*, 1975, *40* (Series No. 163), 1–119.

Stern, P. R., & Shavelson, R. J. *The relationship between teachers' grouping decisions and instructional behaviors: An ethnographic study of reading instruction.* Paper presented at the meetings of the American Educational Research Association, Los Angeles, 1981.

Stinchcombe, A. L. Bureaucratic and craft administration of production: A comparative study. *Administrative Science Quarterly*, 1959, *4*, 168–187.

Stodolsky, S. S., Ferguson, T. L., & Wimpelberg, K. The recitation persists, but what does it look like? *Journal of Curriculum Studies*, 1981, *13*, 121–130.

Thompson, J. D. *Organizations in action.* New York: McGraw-Hill, 1967.

Ward, B. A., Tikunoff, W., & Mergendoller, J. *A study of allocation and utilization of teaching-learning tim in fourth grade mathematics: Student participation styles in instructional work activity.* San Francisco: Far Wes Laboratory, 1980.

Weinstein, R. S. Reading group membership in first grade: Teacher behaviors and pupil experience ov time. *Journal of Educational Psychology*, 1976, *68*, 103–116.

Woodward, J. *Industrial organization: Theory and practice.* London: Oxford University Press, 1965.

CHAPTER 4

The Social Organization of Instructional Grouping

JAMES E. ROSENBAUM

Overview

The decade of the 1970s produced a great increase in the attention to social issues raised by instructional grouping and to the social character of many kinds of instructional groupings. A survey of the field in 1970 would have found a great deal of attention to ability grouping, but that research largely ignored the social character of that practice.

The 1980s may be a critical time in the development of research in this area: the amount of research has increased and the risks are great. The greatest risk at this period is that the work might become routinized to fit some early formula. Some good model of research might become the model that every investigator tries to follow and it might be repeated endlessly without much thought of what distinctive features the particular repetition offers.

This seems to be what happened to the ability-grouping literature between 1930 and 1980. Hundreds of studies were done following the same research design. Unfortunately, this approach seemed to have been based on the bet that ability grouping in all schools had the same effects, and, when the various studies found contradictory findings, this research approach netted very little other than confusion. For instance, reviewers who have charted the pattern of findings in studies of the effects of ability-grouping on achievement have found almost equal numbers of studies finding positive effects as those finding negative effects. Even those who have tried to reach some conclusion out of the literature sometimes have reached contradictory conclusions (cf. Rosenbaum, 1980a for particulars).

Surely there is nothing wrong with replication as a scientific strategy. The scientific enterprise requires it. But replication must be done with an eye toward recognizing

THE SOCIAL CONTEXT OF INSTRUCTION
Group Organization and Group Processes

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-552220-7

the complexity of the phenomena. Ability grouping and curriculum grouping are not unitary phenomena. They can be set up in many different ways, and they can occur in many different kinds of contexts that can further affect their operation. The massive body of ability-grouping research illustrates only too well the futility of studying ability-grouping effects as if this were a unitary phenomenon that always has the same effects, and it suggests the need for separate analyses by type of grouping.

Unfortunately, looking back over the 1970s at research on grouping, one sees some signs that the same kind of phenomenon may be occurring in studies of curriculum grouping. True, some new models have been developed, and they have been tested over much larger samples of schools and students, but these tests have largely been based on conceptual models that are focused on very narrow issues, and, sadly reminiscent of the old ability-grouping research, reached conflicting findings on some of these issues. As I argue, this disappointing pattern of findings is due to an oversimple conception (indeed, a wrong conception) of tracking effects.

Actually, what is most sad is not the contradictory findings that have come from this research, but the ways that investigators may respond to these contradictory findings. Some of the more persistent may seek to study the issue with ever bigger and better data sets. We have seen a profusion of this approach. Other investigators will reach the conclusion that the phenomena is erratic and not susceptible to systematic research, and they will leave this area of research and move on to other topics.

Both responses are unwarranted. In this presentation, I review the present quandary that we find in this work. In essence I contend that this research is based on a faulty model of a single United States Educational System, which is responsible for some of the conflicting results of this research. As an illustration of the complexities that are being glossed over, studies are reviewed that elucidate some of the dimensions of the social organization of instructional grouping which may affect how grouping operates and what effects it may have. Finally, a study is reviewed which indicates how these structural dimensions of grouping may mediate the effects of schools on student outcomes. The implications for the design of grouping systems and for future research are considered.

Social Attributes of Instructional Grouping

I am construing the notion of *instructional groups* broadly, including any kind of grouping of students for purposes of differentiating instruction. As such, this term may include grouping within classrooms, ability grouping among classrooms, grouping according to different curriculum programs (including vocational programs), and even special education. It is not my aim to maintain that all these forms of grouping are identical; there are enormous differences among them. But all are forms of instructional grouping in that they group students for purposes of differentiating instruction. As such, they create new social entities which have social properties and which are likely to create social outcomes. While these various types of groups are unlikely to create the same social outcomes, they share two important similarities:

1. Students are grouped with those defined to be similar to themselves and segregated from those who are defined to be different; and
2. Group placement is based on socially valued criteria such as ability or postgraduate plans, so that group membership may rank one in a status hierarchy, formally identifying some individuals as better than others.

Moreover, one can ask the same sociological questions about all of these grouping practices:

1. What are the criteria for selecting individuals for these groups?
2. How changeable are individuals' assignments among the various groups?
3. How are these grouping procedures related to the social processes of instruction in groups?
4. How extensive is the grouping over the school day, that is, do groupings change with different subject matter and in nonacademic activities?

In a previous review I examined the first three questions and reviewed the pertinent literature for ability groupings and curriculum groupings (Rosenbaum, 1980a). The last question has special importance as we discuss varying kinds of groupings (cf. Sørensen, 1970). For example, reading groups within a classroom are thought to be less extensive than vocational education programs.

The point here, however, is not whether these various forms of grouping have the same answers to these questions. The point is that, as instructional grouping practices, all of these forms of grouping raise the same sociological issues, which tie them together as the same general social phenomenon, regardless of their different instructional goals.

Of course, these various forms of grouping may differ in the answers each presents to one or more questions. For instance, at least in definition, each form of grouping is presumed to select individuals on the basis of different selection criteria. However, in a previous review, I noted some similarities in the selection criteria used by ability grouping and curriculum grouping, and some variation *within* each type was also evident (Rosenbaum, 1980a). This suggests that, for purposes of sociological analysis, these educational labels may conceal some of the social differences that exist within a given practice and also may conceal social similarities across practices. A sociological typology suggested by these questions (or another typology, such as the one presented by Sørensen, 1970, 1978), might be a better way of characterizing these practices for the purposes of analyzing their social character and their likely social outcomes. More is presented on this later.

Studies of the United States Educational System

The sociological literature on curriculum grouping has been most concerned with the issue of whether ability or social class is the more important influence on curriculum assignments. This issue is important and bears upon the fundamental question of the meritocratic basis of schooling.

Unfortunately, the research literature has not been able to reach a consensus on this issue. Jencks, Smith, Ackland, Bane, Cohen, Gintis, Heyns, and Michelson (1972), Hauser, Sewell, and Alwin (1976), Heyns (1974), and Rehberg and Rosenthal (1978) reported that track assignment is not highly influenced by social class after controlling for students' ability, whereas Alexander and McDill (1976) and Rosenbaum (19[illegible]0b) found the contrary. These were all well-designed studies on very large samples, so the conflicting findings are especially dismaying. The question these studies address is an important one concerning abstract ideological issues; although, as I have noted in a previous review (Rosenbaum, 1980a, pp. 376–377), the issues are actually more complex than this literature usually states them. However, even if we take the simple form of the question as stated, some serious difficulties with the existing research prevent it from being a good empirical test of the question.

Part of the reason for the conflicting findings may be found in technical problems in the research. Although the curriculum-grouping literature studies very large numbers of schools, few studies have sought to make the sample of schools entirely random because of the high cost of doing this. A few studies actually did make this effort, such as the Coleman Report (1966) and the National Center for Educational Statistics (NCES) High School Class of 1972 survey, but even here the problem of selective participation by schools limited the representativeness of the samples. In effect then, each study has been done on a different sample and the conflict in findings may be partially explained by this.

This seemingly minor technical deficiency takes on even greater importance because of another feature of this work: the use of standardized regression coefficients. Although the standardized coefficient does have some desireable features, it is highly dependent on the variance of each independent variable. Of course, that is not too serious if we have a true random sample of a meaningful universe, but, because we generally do not, the standardized coefficients give us results that are highly dependent on the variance that happens to exist in our particular samples. This feature of the design gives a strong likelihood that each study that is done on a different sample will produce different standardized coefficients and a new answer to the meritocratic versus class-bias issue. The flaws of our methodology are not merely technical deficiencies here; they tend to generate conflicting findings on our issue.

But there is an even more serious flaw to this research, and it is a conceptual flaw. This research is implicitly based on the assumption that there is a single United States Educational System, which can be reasonably described by the averages abstracted out of surveys of random individuals in randomly (or quasi-randomly) selected schools. Of course, we know better. United States education is anything but a single system. It is a highly decentralized set of systems with varying forms of institutional structures within them. While it may be useful from a social policy perspective to analyze social indicators to describe the average relationships between various kinds of inputs and outputs, we know that very different kinds of institutional structures mediate these relationships, and they are likely to do so in very different ways.

Currently, a very acrimonious battle exists in economics between neoclassical and institutional analysts of labor markets. It centers on the conflict between specific structural theory based on institutional analysis and abstract theory supported by statistical analyses of the relationship between inputs and outputs. In that conflict, sociologists have generally sided with the institutional analysts whose approach relies on sociological models of structure, institutional practice, and equity norms. Ironically, a well-articulated institutional analysis of school grouping effects is generally missing in the prevalent sociological research on grouping.

Although tracking, per se, is taken by this research as a structural phenomenon, most of this research also assumes that it can be interpreted to be a unitary phenomenon, that is, that it takes pretty much the same form in all schools and operates in the same ways. If we assume for the moment that there were even only two different forms of tracking (one form that was highly responsive to students' ability and another that was not) then the average results obtained in these studies would not be describing the process in either type of tracking. They would describe only the average of the results of the two processes across the schools that happen to exist in the nonrandom sample.

Of course, we do not know even what kinds of institutional types of tracking exist in different schools. Thus, even if we wanted to disaggregate the survey analyses, at the present stage we do not even know what variables to measure to control for institutional type. Until we know what different institutional types exist in different schools, studies are likely to continue to be highly dependent on the vagaries of our sample, rather than on the actual operation of tracking in schools.

Typology of Institutions

Sørensen (1970) provides one of the first conceptual analyses of the various dimensions on which grouping systems might differ, and he has subsequently provided substantial elaboration of the model (Sørensen, 1978). Arguing that the conflicting pattern of results in the ability-grouping research may be due to the "theoretical meagerness of the research," he attempts to specify the dimension of organizational differentiation. The following dimensions are identified:

1. Vertical versus horizontal differentiation
2. *Inclusiveness*—degree to which differentiation leads many, rather than few, students to a higher level of education

3. Selection procedure
    a. *Electivity:* degree to which student preference plays a role
    b. *Criterion:* the standards used for making the selection
    c. *Selectivity:* the amount of homogeneity created in groups
4. *Scope:* extent to which the student is a member of the same group over time.

Whereas Sørensen presented an abstract conceptual analysis of the dimensions on which grouping systems might differ, Rosenbaum's (1976, 1978) detailed case study of a single school describes an example of a grouping system which illustrates how these dimensions might operate in practice. This analysis of ability and curriculum grouping in a white working-class high school illustrates the operation of the selection procedure, showing the role of students' choices, the particular selection criteria employed, and the degree of selectivity applied. By studying these issues in a single school, the study was able to investigate the relationship between selection outcomes and school practices, particularly the practices of guidance counselors, who were key to the process. This analysis provides a specific example of the ways that one school operated on the general dimensions suggested by Sørensen, and it also shows the relationship between practices and outcomes.

A detailed case study also makes it possible to see some of the complexities involved in Sørensen's dimensions. For instance, Sørensen speculated that whereas ability grouping was a form of vertical differentiation, curriculum grouping would be horizontal differentiation, on the assumption that different subject matters would be equal in status. While this assumption might be true in some cases (e.g., various majors), it seems unlikely to be true of the different curricula in high schools. In the Rosenbaum case study, college curriculum was clearly considered superior to other curricula. Students were subject to elaborate selection processes to get into and stay in the college curriculum, and students in college curriculum received greater educational resources (better teachers, newer textbooks, better facilities like laboratories, etc.).

Similarly, whereas Sørensen posited that inclusiveness and scope were properties of the entire grouping system, the case study suggests that the grouping system varies in its inclusiveness and scope in different parts of the system. This system is highly inclusive in its early stages (through junior high), but it becomes less inclusive over time. Because increasingly more students are eliminated from the highest college tracks each year, while virtually no students from other tracks are allowed entry into these tracks, this system was described as a tournament model (Rosenbaum, 1976, p. 40). In the tournament model, college track students vied to stay in the competition while students in the other tracks had already been eliminated. In this tournament system, the scope of grouping depends on which group one is in. While the lowest (general) track has large scope (permanence of membership) because there is nowhere for them to transfer, the college track has more limited scope, for students are moved out of this group each year.

The point of this analysis is not to assert that all grouping systems resemble the tournament model. Rather this single case study provides an empirical example of one type of grouping system suggested by Sørensen's typology; it illustrates a grouping system that is fairly extreme on several of Sørensen's dimensions. As such, it provides some indication of the applicability of these dimensions. This case also suggests some of the dynamic features of a real grouping system, which were not described by Sørensen's conceptual scheme, particularly regarding the direction of mobility, and it suggests how they make Sørensen's dimensions differentially applicable to different parts of the same grouping system.

Of course, the case study is not only an isolated phenomenon; it is also a study within a particular type of community. The research purposely selected a homogeneous white working-class school for study, based on several assumptions. It was speculated that the homogeneity of the student body made it less likely that the school's selections would be socially biased, since there would be minimal differences among students in their background characteristics. The working-class background of the students may have intensified the impact of the schools' selections on whether these students attended college, because these students' parents had little knowledge about college admissions processes. Observations of parent–counselor interactions also suggested that the lesser education of these parents put them at considerable disadvantage so that in cases of conflicts, the counselors' opinions generally prevailed.

If these inferences are correct, then we may be able to find examples of grouping systems at the opposite end of these dimensions by studying middle- and upper-middle-class schools. Although Cicourel and Kitsuse's (1963) study of an upper-middle-class suburban school did not systematically analyze patterns of track mobility, their description did suggest that counselors tended to be highly responsive to parents' wishes (although this was not invariably true), and they suggested that going to college was taken for granted by most students. In such a situation, there was no indication of the winnowing out process suggested by the tournament model.

Another study of students of predominantly middle-class background did attempt to study track mobility explicitly. Rehberg and Rosenthal (1978) studied students in seven schools in southern New York state, where only 16% of all seniors did not choose to attend college. These white-collar communities are likely to be far more encouraging of college attendance than the working-class community I studied. Could it be that this type of community leads to a different type of mobility pattern? The authors report findings that suggest that it does; they conclude that the track systems in these schools showed more upward than downward mobility between ninth and tenth grades (p. 127).

However, their study suffers from a serious defect, which casts doubt on this finding. In many respects this is an excellent study. The researchers went to great expense to follow students longitudinally. They also established strong rapport with the schools and even obtained official school records on students' actual grade point averages and ability test scores. Unfortunately, they did not ask schools about students' actual track placements. Instead, they relied upon students' reports. In retrospect, this was a serious mistake. Analyses of the National Longitudinal Survey of the Class of 1972 have shown that students' reports of their track placements in their senior year are only modestly correlated with their actual track placements as indicated by the school records ($r = .60$); that is, students' reports only explain 36% of the variance of actual track placements (Rosenbaum, 1980b). Clearly, research on tracking cannot rely on student's reports. As a result, Rehberg and Rosenthal's finding only tells us that students' reports show upward movement, but we do not know whether upward track mobility really occurs.

Studying track mobility turns out to be a difficult matter in this country. In contrast with British schools, which have been (until recently) quite explicit in their practice of assigning students to separate schools for each curriculum so that mobility among curricula was generally not feasible, United States norms against closing off opportunity make it difficult for schools to implement such a rigid system, or at least to admit such a system as official policy. This ambivalence makes it difficult for researchers (and parents) to know what actual practice is on this issue, because school administrators would have difficulty admitting that their school did not permit mobility.

Sometimes the data have become available in unusual situations. For instance, data on Washington, D.C., schools became available through a desegregation court case, and the analysis found that placements were permanent for 90% of students (*Hobson* v. *Hansen,* 1967, p. 16760).

Analyzing school records subpoenaed from a junior high school in Michigan, researchers found considerably more mobility: 60% of seventh-grade students were in the same curriculum 2 years later (Jones, Erickson, and Cromwell, 1972). However, the researchers also noted a tendency for mobility to be much more often in a downward direction than in an upward direction, and this was particularly true for black students.

Of course, there is no reason to expect that these situations are representative of all schools. While these findings clearly support the contention that the track mobility patterns I found are not totally unique, they do not exclude the possibility that other patterns exist. We must look forward to subsequent research identifying other kinds of track systems and the ways that they operate.

Although not addressing precisely the same issue, a study by Davis and Haller (1981) provides intriguing findings that extend the issue. The study compared eighth-grade pupils' track preferences (before they had formally been put into tracks) with the actual track into which they were subsequently placed. The study finds that pupils are more likely "to be moved up into tracks higher than the ones they chose for themselves, rather than the reverse" (p. 290). The researchers conclude that "these data suggest an important modification of Rosenbaum's (1976) notion that the high school selection process resembles a tournament where contestants can only be eliminated (i.e., move down)" (p. 290).

Although I concur that these data are important, I think the authors are mistaken in thinking these results conflict with the tournament model. An over-inclusive initial selection process is not necessarily at odds with the tournament model. A high degree of initial opportunity would be an excellent way of encouraging students to perceive that they have been given a chance to succeed, before a subsequent tournament begins operating to winnow down the winners. Unfortunately, Davis and Haller do not report how their schools operated subsequently, so the matter cannot be tested.

Of course, these are all isolated studies of particular individual schools. The generalizability of any of these findings must remain dubious. Although our speculations about the effects of student-body social composition on group–system characteristics may be a fruitful one for further explanation, we lack sufficient evidence for inferring its generalizability. What these studies do clearly document is the fact that grouping systems differ on many of the dimensions that Sørensen identified. In particular, these studies have provided examples that differ greatly in terms of inclusiveness and scope. The fact that these grouping systems may have different amounts of inclusiveness and scope within them does suggest some modification of Sørensen's model, but his dimensions remain as important descriptors.

Effects of Grouping Systems on Student Outcomes

Of course, establishing that these dimensions reflect real variations in actual grouping systems is only the first stage of the question. Once the various types of grouping systems have been identified, we should like to know how these grouping systems affect student outcomes.

For instance, a tournament-type track system would have implications for the issue of whether tracking is class biased or meritocratic. Schools using this kind of track system would present structural barriers to upward mobility for students whose academic aptitude improved, namely, late bloomers. Psychological research and theory suggests that academic aptitude only unfolds over time with many of its more important attributes only appearing in adolescence (cf. Piaget's formal operations). Some sociological research, moreover, suggests that some of what teachers use as indicators of academic abilities in the earliest years of schooling may actually be simple social-class-related values and behaviors (Gouldner, 1978; Rist, 1970). Track systems that permit little mobility or only one-way mobility would tend to be less responsive to late-developed abilities and to be more strongly influenced by students' socioeconomic background. In contrast, track systems that permit more mobility (particularly, upward mobility) would offer more opportunity for early selections related to social background to be reversed by subsequent achievements. Consequently, how much and what kinds of mobility a track system allows may be an important determinant of whether the track system is class biased or meritocratic. If we want to understand the circumstances and types of track systems that create meritocratic or class-biased placements, mobility patterns are certainly one attribute of tracking we would want to investigate.

Sørensen (1970) also speculated about the implications of various kinds of grouping systems on students' learning, aspirations, beliefs, interests, social interaction, and educational attainment. He placed special emphasis on the ways that grouping systems might reinforce or limit the influence of family background on students' educational attainment. Sørensen further articulated some of these ideas in his subsequent 1978 paper; however, in the decade since his first speculations, little empirical work was on these issues.

The difficulty, of course, is in making comparisons across different grouping systems. The large survey studies that consider many different schools have not attempted to consider the type of grouping system in each school. The studies that have described the various kinds of grouping systems have generally only studied one type of grouping system so they have been unable to compare the effects of different types of grouping systems.

Johnson (1979) provides one of the few efforts to compare the effects of different grouping systems on student outcomes. Using the Project Talent national sample of high schools, he studied the relationship between the degree of organizational differentiation of students (by various kinds of grouping) and school rates of college-bound students and dropouts. He also extended this analysis, controlling for the socioeconomic status and economic growth of the school–community environments. Johnson characterized the 807 schools in his sample by the amount and extensiveness of grouping used in these schools, as reported by school principals. Factor scores on 10 survey indicators were computed and the distribution of these scores was collapsed into high, medium, and low ordinal categories for cross-tabulation. The two outcome-variables of the study (school rate of college-bound students and student dropout rate) were also taken from principals' reports of the actual rates of college attendance and dropout rates for the school. Obviously, we must be concerned about possible distortions in principal's reports on these matters, particularly on the issue of dropout rates (drop-out rate analyses are discussed here).

The cross-tabular analysis showed positive bivariate associations between the school's extensiveness of grouping and the school's college attendance rate. However, the association is highly conditional on the socioeconomic status of the school communities. Of particular interest, Johnson found that for communities of high and middle socioeconomic status (SES), grouping is not associated with the rate of college attendance, largely because of the high rate of college attendance from all of these schools. In contrast, the college attendance rate of low SES schools was strongly affected by the extensiveness of grouping. Of low SES schools with extensive grouping, 69% had high or medium college-attendance rates, whereas only 44% of the least-grouped low SES schools had this magnitude of college attendance.

This finding suggests that grouping is primarily beneficial for college attendance in low SES schools, the schools in which college attendance is most problematic. Other researchers have suggested that college attendance is nearly taken for granted in upper and upper-middle SES schools (e.g., Cicourel & Kitsuse, 1963). Moreover, research also indicates that parents have a strong influence on student's college aspirations in middle-class families (Kandel & Lesser, 1972), but that college attendance is more problematic in working-class families (Kahl, 1953), at least in the 1950s and 1960s. Johnson's findings suggest that for the youth of just such families, the school's grouping practices may have the greatest impact on students' college attendance.

Although Johnson does not comment on it, his data present an interesting additional finding on a prior question: the antecedents of extensive grouping. Johnson's data suggest that extensive grouping is most prevalent in higher SES schools and least prevalent in lower SES schools. Indeed, while over 60% of the high SES schools fall into the highest of the three categories for extensiveness of grouping, over 60% of the low SES schools fall into the lowest of the three categories, while the middle SES schools are nearly evenly divided among the three categories. High SES schools seem to make the most differentiations among students, while low SES schools seem to make the least differentiations among students.

Despite the limitations of these analyses, they do suggest some fascinating tentative ideas about the nature and effects of grouping. The finding that grouping is most extensive in high SES schools may only reflect the greater economic resources these schools have to devote to the creation of special programs. However, it may also indicate the greater concern these schools have for responding to the individual differences among students and for differentiating them further in terms of the instruction they receive and the futures they are prepared for. This is quite consistent with Wheeler's (1966) speculations about the occurence of homogenizing and differentiating environments and with extensions of these ideas (Rosenbaum, 1975, 1976, Chapter 9).

Of course, Johnson's findings seem to suggest that grouping does not have much effect in differentiating outcomes for the students in the high SES schools, but this may be an artifact of the outcome indicator he used. Like nearly all research in this area, Johnson only considers the simple outcome of college attendance or not, and this outcome is extremely frequent in all high SES schools. However, my study of a single school suggested that increased differentiation (ability grouping within the college track) may also contribute to determining what kind of college students attend (Rosenbaum, 1976). It would be interesting to investigate whether extensive grouping was more likely to lead to differentiation of student outcomes in terms of the *quality* of colleges that students attend. Moreover, one could test whether this is more likely to be true in the high SES schools, which we have speculated are more concerned with differentiating students, or whether extensive grouping always leads to the same degree of college diversity, regardless of community setting.

The main finding that Johnson focuses on (the greater effect of extensive groupings on the college attendance rates in low SES schools) does seem to suggest a policy implication. It suggests that grouping may be most effective in low SES schools.

Of course, we must be cautious about assuming that this correlation necessarily indicates a causal relationship in this direction. Other explanations of the findings are plausible (causality in the reverse direction, third factors that lead to both outcomes, etc.). These possibilities should be tested. What is most clear is that this kind of systematic analysis of comparative institutional effects can address some important issues that have largely been neglected by previous analysis.

Implications: Improve Selection Decisions or Redesign Structures?

This disaggregated approach permits us to come to terms with the dilemmas that grouping creates at the level of schools, grouping systems, and individuals. While it is useful to have an overview of more macro-level phenomena, the ultimate purposes of grouping systems can only be discerned at the micro level, and this is the level at which we need to evaluate its success.

Haller (1981) has provided a model that clearly articulates a dilemma of creating grouping systems, the problem of decisions at the margin. He contends that it is at the margin, among the individuals who are closest to the borderline between groups, where most grouping misassignments occur and where other criteria are brought to bear in deciding placements. Moreover, it is in just these cases where SES influences are most likely to enter. Haller tests this model for the reading group recommendations made by teachers of 37 fourth-, fifth-, and sixth-grade classrooms in five schools in central New York State. The researcher also noted the reasons teachers gave for each particular placement they recommended. It should be noted that these were hypothetical placements, constrained by the researcher to only three different groups.

The results provide strong support to the model. Haller concludes that "the small but persistent increment in the socioeconomic segregation of children . . . may be a consequence of requiring teachers to make difficult if not impossible distinctions. . . . (W)hen the most obviously relevant criterion—reading skill—becomes difficult to apply, other criteria may be substituted for it; (and) these other criteria are likely to be related to pupil SES" (p. 20).

Some of these criteria are clearly legitimate—teachers' judgements of general academic competence and willingness to do school work. Haller also argues that even teachers' judgements about family background may conceivably be legitimate. Haller devotes considerable space to discussing aspects of family background which might arguably be legitimate, for example, where family background was educationally helpful.

The points that Haller is making are important. Without passing judgment on their merits, it is evident that they have not been sufficiently considered in the existing literature. Given the strong interest that the available literature has shown in the magnitude of influence of merit and SES, it is disappointing how little attention has been given to what actual criteria may underlie our indicators of SES and merit. Given the biases and limitations of tests, it is not entirely clear that our indicator of merit is the optimum criterion for grouping. Also, given our beliefs about choice and more general criteria for selection, it is not entirely clear that SES should not be a component of selections (for a fuller discussion, cf. Rosenbaum, 1980a, p. 376).

Haller advances plausible arguments that could conceivably justify alternative criteria. He does this in order to show that teachers cannot be blamed for these decisions. Haller describes the dilemma that teachers face, and he effectively makes the point that they do the best that they can in making arbitrary decisions. The problem, though, is not the teachers' decisions, but the fact that they are forced to make arbitrary decisions, and here is where Haller's analysis stops too soon.

Haller's analysis stops short of addressing the more general point: What form of grouping, if any, should exist? This question, to which Haller gives only passing attention, would seem to be the most important raised by his analysis. Grouping demands that selections be made; selections must necessarily be arbitrary at the margins; and, indeed, given our conception of ability being normatively distributed, large numbers of individuals are likely to be at the margins. If we concur with Haller that these are nearly impossible distinctions, then we must question whether they ought to be made at all, how will the social and ability composition of the school influence whether and what kind of groupings should be made, and, if made, we must question what consequences will be allowed to emerge from them.

The answers to these questions require an analysis of many aspects of the grouping system. Haller's analysis provides one important component: it shows how irrelevant and potentially biased criteria may enter into these selections and how arbitrary they may be. Other questions that must be addressed involve the costs and benefits that come from the grouping system--the magnitude of costs and benefits, which individuals are affected, and how long-lasting the costs and benefits may be. Of particular concern is whether some grouping systems magnify the differences among individuals in different groups so that individuals who were initially highly similar become significantly different because of the action of the grouping system.

Of course, the ability-grouping literature has produced mixed and inconclusive results on this issue. However, as we have suggested, the pattern of results might be clearer if this research had systematically controlled for the structure of grouping. Indeed, some recent research has begun to suggest that the structure of grouping may contribute to the evaluations of pupils by teachers, classmates, and self (Rosenholtz & Rosenholtz, 1981; Simpson, 1981).

At an even simpler level, descriptive research that focuses on the structure of the grouping system may reveal how appropriate (or inappropriate) the mobility changes are to the kinds of selections being made. Arbitrary selections, absence of choice, or student misperceptions raise many fewer concerns in a grouping system in which students can easily move among groups than in a grouping system that prevents mobility or limits it solely in a downward direction.

Although research must necessarily limit analyses to simple indicators, it must not be forgotten that grouping systems are systems, and it is the relationship among their various features that makes them work or not work. Policy analysis must evaluate grouping systems in terms of the ways their various aspects relate to one another. This is where research can contribute most to helping policy-makers assess various forms of instructional grouping.

Implications for Research

The central message of this chapter has been a call for institutional analyses of instructional grouping. I have tried to show the limitations of previous large-scale analyses that average results over all individuals without concern for institutional structure or context. The problem is not so much in the data used in these analyses, but in the analytic approach that obscures the underlying mechanisms and structures. It is only by disaggregating our analyses and looking at a much finer level of analysis that we will begin to have some clearer understanding of these issues. An example of an alternative approach to the same kind of data is illustrated by Johnson's study of the Project Talent survey data.

Despite the promising work in this analysis, it is too soon for research to turn exclusively to such large-scale analyses of institutional effects. While the generalizability of the results of individual case studies may be difficult to infer, such studies are still the best way of discovering the dimensions that need to be studied. I suspect that the phenomena described in my own case study are not representative of the operation of tracking in all high schools across the United States, yet my review of the existing literature finds no systematic documentation of any alternative system. Rehberg and Rosenthal (1978) present findings that seem to suggest an alternative; yet, on closer inspection, their indicator of tracking cannot be given much credence.

Of course, although isolated findings that contradict previous work would be useful for raising new issues, the most useful new work would also show the operation of the system as a whole. Ideally, such research would combine many kinds of analyses; analyses of mobility patterns would be compared with students' initial track choices and their changes of choices, and these would be compared with the influence of ability, school performance, and social background. Research should also look at the relationship of tracking to later educational and occupational attainments. It is the *relationships* among the various aspects of tracking that make it a system and that permit us to understand how it operates, why it operates as it does, and what kinds of functions and dysfunctions are created by the system.

Of course, a key problem is the choice of which track systems to study. As the status-attainment model suggests, the central social feature of the various forms of instructional grouping is that they take individuals with a particular set of abilities, aspirations, and social backgrounds, and they ultimately allocate them into various educational and occupational careers when school ends. Institutional analysts can use this model as a way to discover the relationships between institutional contexts and various kinds of input–output combinations. This can be a way of making systematic selections of particular cases for study.

For instance, Are predominantly white-collar high schools (such as the ones studied by Rehberg and Rosenthal, where less than 16% of all seniors chose *not* to attend college) associated with a particular kind of track system? Does the track system in this kind of community over-include students in college tracks at the outset and then winnow them down slightly over time as the tournament model would suggest? Does the track system move them back and forth equally? Or does it, as Rehberg and Rosenthal interpret their findings, move students up more often than it moves them down? Alternatively, is instructional grouping itself fairly irrelevant to the college attendance decision in such a relatively high SES school, as Johnson's findings would suggest (although it might be influential for the kind of college students attend)?

As another example, there has been considerable speculation about what changes have occurred since the rapid growth of community colleges. Analyses in the 1970s suggested that community colleges created great increases in opportunity for lower- and middle-class students (Rosenbaum & Velez, 1982). However, even this question may quickly be outdated given state and federal cutbacks in programs supportive of community colleges and students during the 1980s. This raises the question of how tracking systems and their effects change over different historical periods—the counterpart of the issue of changing promotion chances in a corporation over periods of increasing and declining growth (Rosenbaum, 1979, 1984). Studies of the tracking system (and its effects over the radically different circumstances that have obtained over the late 1960s, 1970s and early 1980s) may contribute a great deal to our understanding of the relationship of institutional grouping to external educational and labor markets.

There is much to be learned by studying the structural components of grouping systems. Instructional grouping systems have evolved to serve a number of diffuse instructional purposes without a great deal of analysis of how well these grouping systems actually serve the intended purposes and with virtually no systematic attention to their structural features or to the social processes that may accompany them. Clearly such analysis is sorely needed if we are to understand the social features of these instructional programs.

Acknowledgments

The author is particularly grateful to the editors of the volume and to Marianne Amarel, the conference respondent, for helpful comments which improved this chapter.

References

Alexander, K. and McDill, E. L., Selection and allocation within schools: Some causes and consequences of curriculum placement. American Sociological Review, 1976, 41, 963-980.

Cicourel, A. V., & Kitsuse, J. I. *The educational decision makers.* Indianapolis: Merill, 1963.

Coleman, J. S., Campbell, E. Q., Hobson, C. J., McPartland, J., Mood, A. M., Weinfeld, F. D., and York, R. L. *Equality of educational opportunity.* Washington, D.C.: U.S. Government Printing Office, 1966.

Davis, S. A., & Haller, E. J. Tracking, ability and SES: Further evidence on the 'revisionist-meritocratic' debate. *American Journal of Education,* 1981, *89*(3), 283–304.

Gouldner, H. *Teachers' pets, troublemakers, and nobodies: Black children in elementary school.* Westport, Connecticut: Greenwood, 1978.

Haller, E. J. *Decisions at the margins: Toward an explanation of the relations between ability group placement and pupil SES.* Paper presented at the American Educational Research Association Annual Meeting, Los Angeles, California: 1981.

Hauser, R. M., Sewell, W. H., and Alwin, D. F. *High school effects on achievement.* Paper presented at the meeting of the American Sociological Association, Montreal, 1976.

Heyns, B. Social selection and stratification within schools. *American Journal of Sociology,* 1974, *79,* 1434–1451.

Hobson v. *Hansen,* 1967, 269 F. Supp. 401 (D.D.C.).

Jencks, C., Smith, M. Ackland, H., Bane, M. J., Cohen, D., Gintis, H., Heyns, B., & Michelson, S. *Inequality: A reassessment of the effect of family and schooling in America.* New York: Basic Books, 1972.

Johnson, P. *High school ability grouping practices and the stratification of educational outcomes: Some research findings.* Paper presented at the American Sociological Association Annual Meeting, Boston, Massachusetts, 1979.

Jones, J. D., Erickson, E. L., & Crowell, R. Increasing the gap between whites and blacks; Tracking as a contributory source. *Education and Urban Society,* 1972, 4, 339–349.

Kahl, J. Educational and occupational aspirations of "common man" boys. *Harvard Educational Review,* 1953, *23,* 186–203.

Kandel, D. B., & Lesser, G. S. *Youth in two worlds.* San Francisco, Jossey-Bass, 1972.

Rehberg, R. A., & Rosenthal, E. R. *Class and merit in the American high school.* New York: Longman, 1978.

Rist, R. Student social class and teacher expectations: The self-fulfilling prophecy in ghetto education. *Harvard Educational Review,* 1970, *40,* 411–451.

Rosenbaum, J. E. The stratification of socialization processes. *American Sociological Review,* 1975, *40*(1), 48–54.

Rosenbaum, J. E. *Making inequality: The hidden curriculum of high school tracking.* New York: Wiley/Interscience, 1976.

Rosenbaum, J. E. The structure of opportunity in school. *Social Forces,* 1978, *57*(1), 236–256.

Rosenbaum, J. E. Social implications of educational grouping. *Review of research in education, 1980* Washington, D.C.: AERA, 1980. (a)

Rosenbaum, J. E. Track misperceptions and frustrated college plans: An analysis of the effects of tracks and track perceptions in the National Longitudinal Survey. Sociology of Education, 1980, *53,* 74–88. (b)

Rosenbaum, J. E. Organizational career mobility: Promotion chances in a corporation during periods of growth and contraction. *American Journal of Sociology,* 1979, *85,* 21–48.

Rosenbaum, J. E. *Careers in a Corporation: The Internal Stratification of an Organization.* New York: Academic Press, 1984.

Rosenbaum, J. E., & Velez, W. Getting into junior colleges and four-year colleges. In P. Carey & A. Marian (Eds.), *Beyond access and enrollment.* Minneapolis: University of Minnesota Press, 1984 (in preparation).

Rosenholtz, S. J., & Rosenholtz, S. H. Classroom organization and the perception of ability. *Sociology of Education,* 1981, *54*(2), 132–140.

Simpson, C. Classroom structure and the organization of ability. *Sociology of Education,* 1981, *54*(2), 120–131.

Sørensen, A. B. Organizational differentiation of students and educational opportunity. *Sociology of Education,* 1970, *43,* 355–376.

Sørensen, A. B. *The organizational differentiation of students in schools.* Paper presented at the National Invitational Conference on School Organization and Effects, San Diego, California, 1978.

Wheeler, S. The structure of formally organized socialization settings. In O. Brim & S. Wheeler (Eds.), *Socialization after childhood.* New York: Wiley, 1966.

CHAPTER 5

First-Grade Reading Groups: Their Formation and Change*

ROBERT DREEBEN

Research on Grouping

The research history of ability grouping in elementary school classes is one of missed opportunities and unasked questions. The term *ability grouping* has taken on a conventional meaning that refers to ability or achievement differences between classes within a school grade—what the British call *streaming*. It does not always extend to the commonplace occurrence of grouping within classes, especially in first- and primary-grade reading instruction. Moreover, although ability grouping in the conventional sense does have a research literature, the in-class variety lies relatively undisturbed by research. This does not prevent observers from praising it as "an accepted and commended instructional practice" (Findley & Bryan, 1970, p. 2) or from condemning it (Rist, 1970).

The characteristic design of grouping studies is to select schools that employ grouping and then compare the learning of high-ability pupils assigned to homogeneously composed classes with the learning of pupils of similar ability assigned to heterogeneous classes; and so on for average- and low-ability classes and pupils. Studies employing this design are not primarily concerned with the nature of grouping but with individuals and their experience. This experience is defined by the fact that each pupil has membership in a class, school, or district identified as being grouped. Thus, if a district or school is known to distinguish classes by ability, the pupils in that district or school are said to be grouped. They are compared, then, with pupils in other districts or schools who are not grouped. This kind of design does not tell us about the nature of

---

*The work reported on in this paper was supported by the Educational Finance and Productivity Center at the University of Chicago and by the National Institute of Education under Contract No. 400-77-0094. The help of Rebecca Barr is gratefully acknowledged.

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-552220-7

grouping per se, only about levels of individual performance related to membership in classes or groups distinguished by ability.

Many studies indicate that grouping, presumably established to create more homogeneous classes than would appear if random class-assignment were used, still results in considerable heterogeneity. Instructional difficulties are believed to ensue because the distribution of pupils inside classes tends to be diverse. But oddly enough, this diversity has not aroused much curiosity. One can find internal class diversity expressed as a problem of class overlap (Burr, 1931); this designation, however, directs attention not toward the instructional difficulties of teaching classes with wide ranges of ability but rather toward the assignment of pupils in a grade to the appropriate class, the latter being primarily an administrative, not a teaching question.

The phenomena of internal class diversity and grouping suffer other strange fates. Both Barker Lunn (1970) and Daniels (1961), British writers interested in streaming, construe grouping within classes as a source of design error, an obstacle to making clean comparisons between homogeneous and heterogeneous classes. How can such comparisons be made, they ask, when the latter frequently employ grouping within the class? They cannot. But by treating this phenomenon as error, these writers render it a nonproblem, at least in any substantive sense.

In one of the more important United States studies, Borg (1965) explicitly points out that grouping is often accompanied by different instructional treatments. In his own work, he observes that the district with classes distinguished by ability adjusts for differences among pupils by varying the rate of instruction. The district with heterogeneous classes, by contrast, adjusts instruction by enrichment. The distinction between grouping and instruction is exceedingly important conceptually; but once having made it, Borg ignores it empirically by failing to look for variations in rate or in enrichment *within* each district and school. Perforce, the relationship between instruction and within-class grouping does not arise as a problem. Daniels likewise cannot address this problem because he matches schools on the basis of the materials and teaching approaches used.

Much of the difficulty in all this arises from the psychological bias characteristic of most grouping research: the tendency to fixate on individual outcomes and experiences and to think about grouping simply as a way to cope with individual differences. This is not to deny, of course, that individual outcomes are important and that groups do influence individual experience. But to conceptualize grouping exclusively in individual terms ignores the organizational character of grouping and the sequential process by which pupils are assigned to schools, to tracks, to grades, to classes, and, within classes, to groups. Each successive assignment raises different problems of how to manage pupil diversity—for example, by territory at the school level, and by age at the grade level. Pupils of the same age and in the same grade, moreover, differ in ability. And so the problem arises of how the school manages grade-wide diversity so that instruction can be viable. Pupils can be assigned to classes randomly or by some criterion such as ability. In either case, substantial diversity remains within classes, and one way or another teachers deal with it by using both organizational (such as grouping) and instructional means.

In first-grade reading (which is what this chapter is about), teachers characteristically employ ability groups, but less characteristically do so for math. In both reading and math they must deal with class diversity—by using instruction geared to group differences or by using instructional variations adapted to whole-class or seatwork formats. How well instruction is adapted to the whole class, to groups, or to individuals is an empirical question.

It is hard to understand why grouping inside classrooms has received such scant empirical and conceptual attention, especially because so much work, carried out as long ago as the 1930s (Burr, 1931; Hartill, 1936; West, 1933), showed persuasively that once grades are divided into homogeneously composed classes, substantial classroom variation in ability and achievement remains. These early writers, it turns out, were not primarily interested in how schools worked or in how teachers dealt with diversity, but rather tried to show that homogeneous grouping was not feasible because pupils grouped on one characteristic inevitably showed wide variations in others, and that in practice, homogeneously composed classes ended up overlapping in their distributions of ability. The difficulty of making defensible class assignments turned out to be the agenda.

The fact remains: There is not much literature on grouping within classes. It is interesting, moreover, that one of the best-known book-length treatments of it (Goldberg, Passow, & Justman, 1966) turns out not to be about grouping at all but an examination of different class compositions where the ability components of classes are not groups. If this were a grouping study, the authors would have asked, Into what different kinds of grouping arrangements had the teachers transformed these variously composed classes? One can find studies of within-class grouping that in design resemble the homogeneous—heterogeneous class comparisons; but they are burdened with similar flaws in design and conceptualization. The field is not, however, without some promising leads. Eder (1981) draws attention to the difficulties of managing a low-ability group in a study that compares reading groups within a class. But while that work treats groups as real entities that teachers manage in different ways, it ignores instructional differences in the use of time and materials as well as the capacities of pupils. Moreover, the achievement differences between the high and low groups appear closer together than the sharply contrasting group-management differences would lead one to expect, and this suggests that other forces are at work.

Hallinan and Sørenson (1981) present one of the few treatments of how ability groups are formed, stressing the importance of their number and size. But two of their contentions are open to some question. First, groups may not necessarily be the same size; indeed, there are good reasons for their not being so. Second, whether grouping actually leads to the increased dispersion of achievement over time should depend on how the groups are instructed. The instruction of groups, however, is not part of the formulation. But as a discussion of group organization, tied to the properties of classes, this paper makes an important contribution.

The study reported in the present chapter has its origin in the earlier work of Barr (1973–1974, 1975), which demonstrated the combined and independent effects of grouping and instruction on reading achievement. That work also addressed directly the origin and formation of groups and, because of that focus, gave rise to the work we are jointly engaged in (Barr, 1980; Barr & Dreeben, 1983). Yet largely unrecognized in the study of grouping is the work of Dahllöf (1971). Although he was concerned with the comparison of homogeneous and heterogeneous classes, and not with the groups within them, he was one of the first to identify a connection between class composition and a mechanism that governed how rapidly pupils proceed instructionally. His insight might have indicated the sterility of simply comparing homogeneous and heterogeneous classes by rate of achievement, but it has rarely been taken into account.

The Nature of Grouping

The position taken here is that grouping is as much a classroom as it is a grade-wide phenomenon. More than that, the two kinds of grouping are related because the distribution of pupils' characteristics in each class (the result of pupils in a grade having been assigned to classes) constrains the formation of within-class groups. The latter kind of grouping (hereafter called *ability grouping*) is an aspect of the social organization of classes. To say this is also to draw attention to a more general phenomenon: the nested character of school-district organization, in which a district school-age population is assigned to schools, to grades, to tracks (secondary level), to classes, and to within-class groups. Groups, of course, are composed of individuals.

A direct implication of thinking about grouping as one among several different kinds of pupil allocation is that one can take the next step and ask whether at each level of district organization there is a particular agenda of activities and outcomes. And if that is so, is it not also useful to think about how events occurring at each level of the organization impinge upon and constrain what happens at the others?

Let us follow this logic briefly. Learning is understandable only as an individual outcome because only individuals—not classes or schools—learn. It is true, of course, that individual learning can be statistically aggregated to any level; but it is not so clear what these higher aggregations mean conceptually. If learning is an individual outcome, what are the outcomes characteristic of other organizational levels? Without providing an exhaustive list of other organizational levels, one can think of districts negotiating labor contracts, procuring materials and physical resources, setting general curricular priorities, enforcing state and federal policies, and defining school boundaries. On the outcome side, there are the actual results of these activities—the substantive provisions of the labor contracts, the nature of the materials purchased, and so on.

Given district-level constraints, school administrators establish a time schedule governing the allocation of both time and space, integrate one grade's curriculum with that of the next, and, most importantly for this discussion, assign pupils and teachers to classes. It is through class assignment that each teacher is provided with a room full of pupils that has distributional properties: a gender distribution (that might be troublesome in first grade reading if there are many little boys); an age distribution (that might be important if many pupils are young for the grade); and most importantly for beginning reading, a distribution of readiness (or aptitude).

Ability grouping, so commonly used in first-grade reading, is an attempt to deal with the diversity of the ability distribution; it refers to the creation of instructible units out of the total class distribution. Accordingly, at the class level of organization, a critical outcome of teacher activity is the arrangement of groups.

In this brief argument I have tried to place grouping in the context of other activities taking place at different locations in a school system. Grouping is a response to the distribution of pupils' characteristics in a class, particularly reading readiness in the case of reading groups, and represents an attempt to create suitable class subdivisions designed *for* instruction and should not be confounded with instruction itself, which consists of activities carried out *in* groups. Note particularly that a class of 30, for example, can be divided into three groups of varying sizes, into 30 groups of 1 (as in individual seatwork arrangements), and into 1 group of 30 (as in whole-class instruction). Analytically, there is a world of difference between a class of 30 and a plenary instructional group of 30 despite their superficial empirical resemblance. Instruction is not applied to the first; it is to the second. Whole-class instruction really represents a decision to transform a class into an instructional group of the same size.

By implication, to compare the effectiveness of homogeneous and heterogeneous classes, as is usually done (according to their respective rates of individual achievement), is to misspecify the problem of grouping. The same is true in comparing group members in classes with their ability-matched counterparts in ungrouped classes. In both cases, instruction has been short-circuited out of the analysis by ignoring the transformation of classes into groups (of varying size and composition) and by ignoring the instruction of those groups.

A Note on the Data and on the Argument

Before proceeding with the main story, I need to explain that the empirical evidence presented here comes from a reanalysis of earlier work on grouping and instructional pacing in first-grade reading (Barr, 1973–1974, 1975). The total body of material contains evidence on 3 districts, 6 schools, 15 classrooms, 35 and 43 instructional groups (fall and spring, respectively), and 147 first-graders. It was originally collected for purposes quite different from the ones to which it is now being put. During the late 1970s and early 1980s, Barr and I were using the material, which provides evidence on events taking place at different levels of school organization, to address the problem of how schools work and how they produce the outcomes they do.

The ideas presented here are part of a larger endeavor to develop a formulation of school-system organization and the working of schools and classrooms. It involves primarily conceptual activity in which Barr and I have used a rich body of data to rethink some prevailing schemes about schooling. With this in mind, a reader should be fully aware that this chapter does not derive and test hypotheses (null or any other kind), nor does it seek to generalize from a few cases to larger populations. It is an exercise in thinking out loud—or on paper—in a conceptual way, with a body of data at hand. Why, then, the use of statistical tests? Simply to provide some conventional guidelines for assessing which strong and weak relationships should be given conceptual weight as the formulative agenda proceeds. It is important to recognize that there are many ways to use a body of data. One of the most useful is to think about the alternative ways in which the phenomena represented in it can be formulated conceptually. For this task, a small number of well-behaved contrasting cases serves very well, far better in fact than large numbers of cases that may not contain interesting contrasts.

Grouping and Instruction

Grouping is important for individual learning not because of its direct influence but because of its shaping force on instruction, which in turn affects learning. The impact of grouping is thus indirect. The evidence for this is the following: the groups teachers establish have their own distributional properties, and among them is the mean level of reading readiness (aptitude), which turns out to have a powerful influence on the *pace of group instruction* (how much material gets covered over a given span of time by all members of a reading group), explaining 46% of the variance in coverage. Not only does group mean-aptitude influence instructional pace (coverage), but so does the difficulty of materials—the number of new concepts presented per given number of pages, explaining another 15% of the variance.

While the mean aptitude of groups and the pace of instruction are strongly related ($r = .69, p < .01; n = 43$), one must not lose sight of the fact that low-aptitude groups with very similar means differ in pace by a factor of 2.5:1. This indicates that similarly grouped pupils receive vastly different instructional experiences; and for this reason, both the conceptual and empirical distinction between grouping and instruction is crucial to make. Moreover, it should come as no surprise (a) that individual learning of the curricular material taught (words from basal readers) is strongly related to how much of that material pupils actually cover ($r = .93, p < .01; \beta = .81; n = 147$), net of other influences on learning, including socioeconomic status, and individual aptitude; and (b) that the basal words learned has a substantial impact on general first-grade reading-achievement, measured by the Gates–MacGinitie test ($r = .83, p < .01; \beta = .45; n = 147$).

The Formation of Groups

I have argued that the importance of grouping can be appreciated when it is placed in the context of other aspects of school organization and operation, particularly those surrounding the formation of classes and the instructional activities of groups. If nothing else, the exercise helps to account for the inconclusiveness of findings based upon the comparison of homogeneous and heterogeneous classes. This is because in these comparisons some of the fundamental components of the problem are left out: the nature of the classes in which groups are formed and the way the groups (along with resources like materials and time) are used for instruction. But I do not intend to dwell here on the connection between grouping and learning, but rather on how groups are formed and how they change over the course of a school year.

Start with the idea that when a teacher enters a first-grade class in the fall, the composition of that class has already been established by the principal, a school-level event. The teacher must now deal with it by transforming the distribution of pupil characteristics into instructional and instructible arrangements. In the first grade, that usually means groups for reading. While a variety of pupil characteristics (age, gender, maturity) might be taken into account in establishing a grouping arrangement, an indication of readiness and beginning-reading skills are of most direct relevance. It would appear that by forming such groups, teachers try to reduce both the diversity and size of the class. If they establish more than one group, they do change the size and might change the diversity. As to this last point, there is a considerable range of possibilities that I speak to shortly.

The basic question about group formation is whether the distributional properties of classrooms, particularly the distribution of reading readiness, constrain grouping arrangements. To address it, one must think about the shapes of class distributions as well as the dimensions of grouping arrangements. Several aspects of the class distribution pertain to the establishment of grouping arrangements and their subsequent modifications. The first recognizes that aptitudes are dispersed; and if they are widely dispersed teachers will be pressed to provide for wider differences in instructional needs than if all pupils are nearly alike. The standard deviation of class aptitude provides an indication of conditions that entail more or less diversified instructional approaches.

The second recognizes that teachers confront conditions of distributional imbalance, clusters of pupils with special needs at the top or bottom of a class. The skewness of aptitude measures whether the distribution requires teachers to attend to special interests and capacities located asymmetrically. It is a commonplace of teaching that aside from disruptive pupils, the ones who learn slowly for whatever reason are difficult to instruct.

The third aspect, the number of low-aptitude pupils, superficially resembles positive skewness, but it identifies a particular kind of instructional burden: a large number of pupils likely to experience difficulty and to require substantial teacher attention whether or not the class is symmetrically distributed. The number and not the proportion appears to be a better measure of instructional burden: the more there are, the heavier the load. A small proportion in a very large class can amount to a substantial number and create difficulty. A large contingent of high aptitude pupils should not be so problematic.

Fourth is the size of the class; for if classes are large, one or more groups is likely to be large. For some purposes and under some conditions, making one of the groups large is advantageous while under others it is a liability.

Note that of the class properties relevant to group formation the mean is missing. Standard deviation, skewness, size, and the number with low aptitude all pertain in different ways to the spread and shape of the distribution, to its diversity, which is what teachers are likely to attend to as they form groups. The mean, however, indicates central tendency and theoretically should provide no help in understanding the formation of groups, which are solutions to problems of diversity. Nevertheless, studies of educational effects frequently employ measures of school or class climate based upon the mean; and so for practical reasons that speak to the current state of knowledge, or to test whether or not the class mean really has much instructional relevance, it is included. As indicated earlier, however, *group* rather than class means are likely to have greater relevance to both instruction and learning. (The distributional properties of classes are shown in Table 1.)

With the distributional properties of classes in mind, what of the nature of groups? Teachers do not form grouping arrangements in general; they form particular kinds of them, constrained, I argue, by the nature of the class. They first must determine the number of groups. The class as a whole might be treated as one unit (uncommon in reading, common in math) or divided into groups. But into how many groups? The number will be constrained by the size of the class, but more importantly by practical

TABLE 1
The Distributional Properties of Classes

					Children's Aptitude			Number of Low Aptitude Children	Number of Groups	
District	School	Class	Actual Size	Sample Size	Mean ($\bar{X}$)	Standard Deviation (*SD*)	Skewness		Fall	Spring
I	A	1	37	17	40.47	21.34	−0.06	11	3	3
	B	2	35	13	25.54	10.13	0.99	19	3	4
		3	36	18	36.94	17.03	0.49	8	3	4
		4	30	6	32.50	14.61	0.51	10	2[a]	2
		5	35	8	29.50	18.59	1.53	22	3	3
II	C	6	20	6	34.00	11.85	0.32	3	2	2
		7	20	6	46.17	20.18	0.25	3	1	2
		8	19	7	43.43	16.21	0.73	0	1	2
	D	9	27	12	35.92	20.24	0.75	9	3	3
		10	27	8	37.63	26.85	0.63	17	3	4
III	E	11	28	7	38.29	18.40	0.74	4	3	4
		12	29	9	40.89	20.73	0.48	6	2	3
	F	13	37	8	53.38	21.08	−1.16	9	2	2
		14	33	14	44.14	18.76	−0.10	7	3	3
		15	36	8	31.63	13.14	0.98	14	1	2

[a] These are two first grade groups. Class 4 also had two second-grade groups.

considerations related to the number of separate preparations the teacher must make and to the difficulty of supervising the large remainder of the class left over when the teacher instructs a group. One rarely finds as many as five or six reading groups. These reasons along with tradition usually limit the number of groups at the beginning of the year to three, sometimes to two or four.

Along with decisions about the number of groups, teachers determine their relative size. They may be equal, or some may be large while others are small. Such varied considerations as management capabilities and the number of books available can constrain the maximum size of groups. But in keeping with the presumption that low-aptitude pupils are hard to teach, if teachers do form groups of unequal size, the one composed of low-aptitude pupils will be small. That, of course, will depend on how many such pupils there are; for if there are many, a small group might not accommodate them.

Finally, teachers can vary the discreteness of groups, the extent to which aptitudes do not overlap across group boundaries. Classes, then, can differ according to whether the groups are completely nonoverlapping, whether they overlap completely, with each reflecting the distribution of the class, or whether there are various degrees of overlap between groups.

Group number, size inequality, and discreteness represent grouping configurations that are class properties. Class properties, moreover, are composed of group properties, which in turn have implications for instruction. The number of groups is important because it affects the proportion of time a teacher allocates to their direct and intensive supervision and instruction and to the relatively unsupervised seatwork of the remainder of the class. In classes allocating the same amount of time to grouped reading instruction, a class with two groups allocates equal amounts of time to seatwork and to supervised group instruction whereas one with four groups allocates three times as much time to seatwork as to group instruction.

The relative size of groups is especially important for low- and high-aptitude groups. It should be easier to instruct few rather than many low- aptitude pupils because the small group can provide greater participation per unit of time as well as greater opportunity to provide help and support. A small group might enhance the learning of brighter pupils for the same reason, but they are better able to cope under less favorable conditions; indeed, teachers might place them in larger groups because they can manage on their own.

Although the discreteness of groups has only indirect implications for instruction, it does bear directly on how much groups differ in average ability, as indicated by the range of group means. Teachers do not differentiate instruction much in groups of similar composition. By contrast, discrete groups differ more in mean aptitude and in the instruction designed for them than is the case for overlapping groups. The range of group means, then, provides an estimate of how varied instruction is likely to be.

Consider now the connection between the distributional properties of classes and the configuration of their groups. When does a teacher form more rather than fewer groups? Three class conditions might influence the number of groups. First is class size. In first-grade reading, it is easier to instruct and manage small groups. If small groups are desired, larger classes will contain more of them than smaller ones. Second, class diversity will lead to more groups if group homogeneity is a goal. Third, more groups will be formed when a class contains a large contingent of low-aptitude pupils—the better to accomodate their instructional needs.

As suggested earlier, small groups will be established to accomodate low-aptitude pupils. Yet the shape of the class distribution should influence whether small low-groups will be feasible. Visualize several class distributions: one with positive skew (many low-aptitude pupils), one with negative skew (many with high aptitude), and a normal one. In the normal and negatively skewed cases, creating a small low-group can markedly decrease heterogeneity at the low end; it will not decrease it much in the positively skewed classes, however, because the low-aptitude pupils are numerous and thickly bunched together. There is a presumed need, then, for additional small low-groups. One would expect to find classes of unequal-sized groups when there is a small contingent of low-aptitude pupils because the small low-group provides the remedies of small size and homogeneity at the low end of the class. With a large low-contingent, a large low-group is likely to be formed resulting in equal sized groups—unless, of course, the number of groups is to increase beyond three. But as indicated earlier, there are forces inhibiting the proliferation of groups.

Overlap among groups probably arises only in part by design. It may be a function of the difficulty in accurately assessing aptitude at the start of the school year; it may also occur not as a response to class properties but rather might reflect teacher preference for similarly composed groups that equalize the instructional experience of their members. In homogeneous classes, aptitude differences are indistinct, and similar instruction might be appropriate for many pupils; hence, whether or not the groups overlap may not matter very much. The opposite is true in diverse classes which are likely to be characterized by discrete groups and differentiated instruction to accommodate the range of aptitude differences.

The range of group means should directly reflect class diversity: large standard deviation, wide range between means. One can, of course, imagine a highly diverse class divided into two or three completely overlapping groups differing little in mean aptitude—heterogeneous grouping. But in general, one expects diversity to foster the creation of groups that overlap little with considerable difference in mean aptitude.

Empirically, the distributional properties of classes (mean, standard deviation, and skewness) are not strongly associated with the number of groups formed (correlation coefficients range from -0.28 to 0.25, n.s.). Class size and the number of low-aptitude pupils are both more strongly correlated with number of groups ($r = .46$, n.s.). The latter finding is perhaps worth attention; the coefficients are moderately large but not significant ($n = 15$).

The standard deviation of the class is moderately related to group discreteness ($r = .56$, n.s.) and strongly to the range of group means ($r = .89$, $p < .01$); and the number of low-aptitude pupils is related to size inequality ($r = 0.62, p < 0.05$). Note that these statistics were calculated without School C, which did not begin grouping at the beginning of the year, and without School F, in which discreteness was extreme as an administrative artifact. Including School F in the correlation would have inappropriately inflated it ($n = 9$).

While general associations between class distributions and grouping arrangements provide a rough sense of how class properties are related to each other, somewhat more is revealed by looking at specific cases. In School C, the classes are small and contain few low-aptitude pupils; in two of them, the dispersion of aptitudes is wide. The teachers, moreover, hold strong preferences not to group, believing that all pupils should have similar instructional experiences without distinction based on group placement. By December, one class was divided into two groups, and by January the other two. It appears that the relative easiness of those three classes made it possible for the teachers to delay grouping and rely for several months on whole-class instruction. School E classes present a contrasting case: much larger classes with a small low-aptitude contingent, but with traditional grouping from the beginning of the year. Perhaps the difference occurs because of the larger class size or because the teachers had no reservations about grouping. In any case, when the number of low-aptitude pupils is small, teachers appear to have flexibility in selecting a grouping arrangement and in the timing of its establishment; when it is large, the alternatives appear more constrained because a small group will not accommodate them.

Changes in Grouping Arrangements

The description of fall class characteristics, distributive properties, and grouping arrangements provides a sense of how teachers initially organize classes to cope with the diversity of pupil abilities. But groups established in the fall are by no means static; they change over time as does their membership. They change in number, in size, and in membership to the extent that they gain members from and lose them to other groups. (Class sizes and their distributional properties did not change from fall to spring.)

When groups are added and change in size, pupils must obviously have been transferred from one to another. Nevertheless, group change should not be construed solely as the transfer of individuals; for while it has an important individual component, both group and class considerations are also involved. Groups and classes with certain properties might have a greater susceptibility to group change than others with different properties. Transferring individuals may enter existing groups, possibly altering their size and composition, or they may constitute a new group. Thus, individuals transfer; groups form and split.

The evidence on individual transfers is not of primary interest here. It occurred in 12 classes—exclusive of School C for obvious reasons. Of those transfers, 14% moved downward, 15% moved upward, and the rest stayed where they were. Transferring in either direction appeared more closely related to doing well (or poorly) than to aptitude.

The more pertinent question, however, is the changes in grouping arrangements themselves. The most conspicuous difference between fall and spring classes is that in some classes the number of groups remained the same while in others one group was added. In no classes did the number decline. The nine classes starting the year with the traditional three groups (with exceptions to be noted) are distinguishable into two kinds: those with very large numbers of low-aptitude pupils (2, 5, 10), and those with much smaller numbers (1, 3, 4, 9, 11, 12) as shown in Table 1.

As already indicated, teachers with many low-aptitude pupils create large low groups. Whether they create equal sized groups as a matter of preference (as in School C) is moot when the number of low aptitude pupils is large. By the spring, as Table 2 shows, Classes 2 and 10 have undergone a change: both have added a new low-average group that draws from the low and average fall groups, presumably to gain the benefits that small-group instruction provides for less-able pupils. The teacher of Class 5 did not form a new group; the original three were retained, including the large low-aptitude one. However, the composition of the middle and high groups was changed by shifting pupils from the former to the latter, a pattern of change encountered again later.

The remaining six classes have small numbers of low-aptitude pupils, and among them five (1, 3, 4, 9, 11) have small low groups. For reasons not altogether clear, Class 12 has a large low-group, though as noted, the small low contingent does not necessarily constrain toward the employment of a small low group. This pattern suggests that the teachers are not terribly burdened by the demands of the low group and as a result can devote time and energy to finding a more workable arrangement for the abler

TABLE 2

Group Sizes in Classes in Schools A, B, D, and E, Fall and Spring

				Group Size (Fall)					Group Size (Spring)				
School	Class	Class Size	Number Low Aptitude Children	Low	—	Average	—	High	Low	—	Average	—	High
A	1	37	11	9	—	13	—	15	9	—	4	—	24
B	2	35	19	11	—	13	—	11	5	8	11	—	11
	3	36	8	4	—	14	—	18	4	—	8	10	14
	4	30	10	—	—	5	—	10	—	—	10	—	5
	5	35	22	13	—	13	—	9	13	—	9	—	13
D	9	27	9	2	—	11	—	14	2	—	4	—	21
	10	27	17	10	—	7	—	10	7	7	3	—	10
E	11	28	4	4	—	16	—	8	4	—	8	8	8
	12	29	6	16	—	—	—	13	13	—	10	—	6

pupils. (Note that a similar but less pronounced pattern is found in Class 5, which has a large low group.)

While the teachers in Classes 1 and 9 create large high groups in the spring, those in Classes 3 and 11 create new average-high groups (Table 2). What distinguishes these four is their preoccupation with the upper end of the aptitude range. They design alternative grouping arrangements for the abler pupils when the lower end of the range does not create massive difficulties in management and instruction. Class 5 might fit this pattern despite its large low-group, if the teacher is very competent (i.e., can deal with everybody), if she has written the bottom of the class off, or if the problems posed by it were intractable. The fact that this group moves very slowly through instructional materials while the other two proceed at a rapid clip is consistent with the latter two interpretations.

These findings show how the grouping arrangement established at the beginning of the year, in response to the lower end of the class distribution, influences the pattern of group change later on. Of the three classes starting with large low-groups, two added new low-average groups that reduced the size of the original low-group. By contrast, classes starting with small low-groups underwent changes among the high groups, two by adding new high-average groups and two others by expanding the high group while retaining the same number of groups. Large initial low groups, or the class conditions leading to their formation, seem to create later teacher preoccupations with the low end of the class, while small initial low-groups (or their class-related properties) create later preoccupations with the high end.

Of the nine classes, two remain unaccounted for: 4 and 12. Class 4 is a special case of a mixed first–second grade class with only first-graders in the sample. The grouping pattern in both fall and spring is difficult to understand because of the truncated sample. Class 12 is unusual in that the teacher established only two groups in the fall, high and low. Although it contains few low-aptitude pupils, the teacher nevertheless created a large low group. Why she did not start with three fall groups (like her Class 11 colleague) remains unclear.

The indices of grouping arrangements of the nine classes in fall and spring are contained in Table 3. Comparing the size inequality indices in the two time-periods shows that they remain similar in some cases and change in others. Classes in which a substantial number of pupils was moved upward (1 and 9) show a marked increase in size inequality. Classes in which a new average-high group was formed (3 and 11) display a decrease in size inequality because equalization in size among the higher groups occurred, and these came to resemble the smaller low-groups. Classes forming a new low-average group (2 and 10) were characterized by a slight increase in size inequality because at least one of the newly constituted groups was smaller than the others.

Teachers who begin with highly discrete groups tend to continue with them, most likely because their composition remains the same. Further, those who begin with widely differing groups, as indicated by the range of group means, tend to increase group discreteness. Perhaps this occurs because pupils who are inappropriately assigned

TABLE 3

Configurational Properties of Classes in Schools A, B, D, and E, Fall and Spring

		Fall				Spring			
School	Class	Number of Groups	Size Inequality	Discreteness	Range of Group Means	Number of Groups	Size Inequality	Discreteness	Range of Group Means
A	1	3	2.23	0.75	41.21	3	7.77	0.64	32.32
B	2	3	0.90	0.17	12.00	4	2.25	0.02	14.50
	3	3	5.33	0.64	34.49	4	3.00	0.52	36.36
	4	2	5.00	0.23	15.75	2	5.00	0.01	12.75
	5	3	1.77	0.83	40.17	3	1.78	0.40	28.67
D	9	3	4.67	0.65	31.17	3	8.00	0.07	21.00
	10	3	1.33	1.00	52.50	4	1.88	1.00	54.00
E	11	3	4.44	−0.46	21.50	4	1.50	0.49	35.50
	12	2	1.50	0.93	37.10	3	2.44	0.75	44.75

to groups, such as those with low aptitude being placed in high groups, become conspicuous; teachers as a result change their groups to vary less internally. Finally, the range of group means shows marked stability. This feature of the configuration reflects the diversity of the class, which does not change, and the degree of discreteness, which is moderately stable.

While the preceding discussion pertains to the traditional form of grouping found in Schools A, B, D, and E, School F presents a variation of it which combines elements of grade-wide grouping into classes and ability grouping within them. Two classes (13 and 14) contain large contingents of able pupils combined with small numbers of low-aptitude ones. The third class (15) consists of the middle aptitude range of the grade. The teachers in 13 and 14 have small numbers of low-aptitude pupils; not surprisingly they use small low groups. They resemble their counterparts in Classes 1 and 9, keeping their small low groups intact while transferring middle- and high-aptitude pupils. Children transfer both within and between classes: 14 retains its three groups; and 15, which starts with one class-sized group, divides into two, a smaller low-average and a larger one. Despite the grouping of classes within the grade, the same sorts of forces appear to govern the rearrangement of groups as they do in the more traditional arrangement.

The only change occurring in School C is from whole-class instruction to a two-group pattern. Once groups are established, however, their properties remain unchanged, and no transfers of individuals take place between them. The case does suggest, however, that very large instructional groups, found also in Class 15, are vulnerable to fission even in the face of teacher preferences for instructing all pupils similarly. Very large groups, in short, do not appear to be instructionally viable.

Final Observations

The preceding discussion gives rise to some general thoughts about ability grouping, some concluding comments that summarize some of the considerations that go into a formulation about grouping. First, ability grouping within classes, like streaming, tracking, grade assignment, and school assignment, is an organizational response to an organizational problem: how to transform a class characterized by diversity into suitable units for instruction. That transformation of classes is not a self-contained operation but is constrained by events both prior in time and superordinate in origin. The central issue is how teachers respond to the distribution of pupils' characteristics, a distribution shaped by prior administrative decisions.

Second, a *class grouping arrangement* (a configuration of groups of different number, size, and composition) has direct implications for instruction, but only indirect ones for individual learning. Instruction is influenced in substantial part by grouping, but there are other influences on it as well. Grouping, therefore, is not fruitfully viewed as an attempt to deal directly with individual differences among pupils—the conventional wisdom says that it is—yet as a consequence of grouping *and* of instruction, individual differences are addressed as a by-product of grouping.

Third, the class distribution of abilities is a shaping influence on the arrangement of groups. The number, similarity in size, and discreteness of groups are variable in their dependency on class properties but that variation is constrained.

Fourth, grouping and the instruction of groups are conceptually and empirically distinct events. Groups, even ones similar in their composition, are treated differently as teachers carry out instructional activities. This is true despite the fact that the higher the average aptitude level of groups, the more rapid their instruction.

Fifth, group arrangements can change over the course of the year, and pupils can transfer from group to group. These changes are responsive to the properties of the original class distribution of ability (and in all likelihood to the distribution of other characteristics as well), to the initial grouping arrangement, to the difficulties that that arrangement engenders over time, and to how well individual pupils progress. There is nothing guaranteeing that teachers will change arrangements or transfer pupils, for good or bad reasons, or that they will not.

Sixth, there is little point in praising or condemning grouping per se for its instructional and social consequences. It can be used well or ill. The consequences of grouping are at least as much a function of how groups are used as of their mere existence.

References

Barker Lunn, J. C. *Streaming in the primary school*. London: National Foundation for Educational Research in England and Wales, 1970.

Barr, R. Instructional pace differences and their effect on reading acquisition. *Reading Research Quarterly*, 1973–1974, *9*, 526–554.

Barr, R. How children are taught to read: Grouping and pacing. *School Review*, 1975, *83*, 479–498.

Barr, R. *School, class, group, and pace effects on learning*. Paper presented at the meeting of The American Educational Research Association, Boston, April 1980.

Barr, R., & Dreeben, R. *How schools work*. Chicago: University of Chicago Press, 1983.

Borg, W. R. Ability grouping in the public schools. *Journal of Experimental Education*, 1965, *34*, 1–97.

Burr, M. Y. *A study of homogeneous grouping*. New York: Teachers College Bureau of Publications, 1931.

Dahlöff, U. S. *Ability grouping, content validity, and curriculum process analysis*. New York: Teachers College Press, 1971.

Daniels, J. C. The effects of streaming in the primary school: A comparison of streamed and unstreamed schools (Vol. 2). *British Journal of Educational Psychology*, 1961, *31*, 119–127.

Eder, D. Ability grouping as a self-fulfilling prophesy: A mirco-analysis of teacher–student interaction. *Sociology of Education*, 1981, *54*, 151–162.

Findley, W. G., & Bryan, M. M. *Ability grouping: 1970*. Athens, Georgia: Center for Educational Improvement, University of Georgia, 1970.

Goldberg, M. L., Passow, A. H., & Justman, J. *The effects of ability grouping*. New York: Teachers College Press, 1966.

Hallinan, M., & Sørenson, A. B. *The formation and stability of instructional groups*. Paper presented at the meeting of The American Sociological Association, Toronto, August 1981.

Hartill, R. M. *Homogeneous grouping*. New York: Teachers College Bureau of Publications, 1936.

Rist, R. Student social class and teacher expectations: The self-fulfilling prophecy in ghetto education. *Harvard Educational Review*, 1970, *40*, 411–451.

West, P. *A study of ability grouping in the elementary school*. New York: Teachers College Bureau of Publications, 1933.

CHAPTER 6

Effects of Race on Assignment to Ability Groups*

AAGE B. SØRENSEN AND
MAUREEN HALLINAN

Introduction

Within-classroom grouping of students for instructional purposes, particularly in reading and mathematics, is a common practice in elementary grades. Although the rationales for within-classroom grouping and the forms of grouping differ considerably, the most common and traditional form of within-classroom grouping is teacher-led instructional groups. These are subdivisions of a classroom that allow the teacher to work with a smaller number of students for part of the class period.

This type of grouping has two main rationales. One is to reduce inattention among students and to provide more individualized attention to students by the teacher. This rationale appears to be universal for within-classroom grouping, but implies nothing about the composition of groups. A second rationale appears to be almost universal and has implications for the composition of within-classroom teacher-led instructional groups. This is the rationale of allowing the teacher to work with a smaller group that is homogeneous with respect to the aptitude and preparation of the students for the material taught.

Such ability grouping is widely believed to facilitate teaching not only by reducing inattention, but also by allowing the teacher to accommodate the material and form

---

*Paper presented at a Conference on Student Diversity and the Organization, Processes and Use of Instructional Groups in the Classroom, Madison, WI, May 3 & 4, 1982. The research reported in this paper was funded by the Wisconsin Center for Education Research which is supported by a grant from the National Institute of Education (Grant Number NIE-G-81-0009). The opinions expressed in this paper do not necessarily reflect the position, policy or endorsement of the National Institute of Education. We are grateful to Robert M. Hauser, Louise Cherry Wilkinson, Penelope Peterson, and Ed Fuentes for valuable comments.

THE SOCIAL CONTEXT OF INSTRUCTION
Group Organization and Group Processes

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-552230-7

of instruction to the preparation and ability of the students. Within-classroom ability grouping may be seen as a compromise between completely individualized instruction, which is costly in terms of teacher time but presumably most effective, and whole-class instruction, which is less costly but presumably less effective because of inattention and heterogeneity in aptitudes and preparation (Sørensen and Hallinan, 1981).

Ability grouping within the classroom is only one type of instructional grouping intended to reduce differences in ability, preparation and motivation. Other examples of what may be called vertically differentiated instructional groups are tracks at higher grade levels and between-classroom groupings according to ability at lower grades (in Britain, called *streams*). Vertical differentiation of instructional groups provides students of different abilities with unequal instructional resources and teaching experiences and therefore should increase unequal academic achievement. The stated objective is of course often held to be that ability grouping and tracking facilitates learning for everyone. Even if this is true (and the empirical support for the proposition is ambiguous), inequality should increase unless the progress of the brighter students is arrested while the less bright catch up—an unlikely scenario. Consistent with this outcome there appears to be a fair amount of evidence that vertical grouping, including within-classroom ability grouping, increases the variance in academic achievement over what it would be in the absence of grouping.

A feature of school organization that increases inequality of educational outcomes naturally poses the problem of whether it also increases inequality of educational opportunity. The issue here is whether ability grouping (between classrooms or within a classroom) increases or decreases the association between an ascriptive characteristic of the student (socioeconomic origin, race, ethnicity, or gender) and educational outcomes. An increased association would usually be taken to mean that the increased inequality of outcomes also meant increased inequality of opportunity. This could come about in two ways. First, it could result from an association between origin or background characteristics and the assignment to different-level instructional groups with their associated unequal resources and learning environments. Second, it could result from an association between background characteristics and the students' ability to profit from the assumed benefits of the vertically differentiated learning environments created by grouping. The first mechanism by which grouping could influence inequality of opportunity has received considerable attention in research both in the United States and abroad. Most research addresses the problem of whether there is an association between origin or other background characteristics and the assignment to vertically differentiated groups, controlling for some ability measure. In fact a measure not of ability but of academic achievement is usually used.

Numerous studies from Britain report a net effect of social origin on assignment to different streams in primary schools, controlling for differences in achievement or ability (for example Barker Lunn, 1970; Douglas, 1964, Jackson, 1964). In Sweden, Husen (1967) has documented effects of social background on assignment to secondary school branches, and has further shown that the magnitude of the origin bias depends on the criteria used by schools for the assignment: assignment criteria that are less dependent on cognitive traits and assignments that rely more on student and parent wishes tend to establish high net effects of background variables (see also Wilcox, 1961). In the United States, a number of studies has found an effect of origin on assignment to high school tracks. These effects were not explained by ability and achievement differences (Alexander & McDill, 1976; Hauser, Sewell, & Alwin, 1976, pp. 309–342; Rosenbaum, 1976; Schafer & Olexa, 1971). The magnitude of the effect seems to depend on the methodology—Rosenbaum presents much more striking effects from his case study than do those using surveys. There are also exceptions: Heyns (1974) reports no social-class bias in assignment to college track using survey data. The likely reason for the discrepancy is that her measure of achievement is verbal achievement measured after the assignment has taken place.

Most of the United States research on assignment focuses on vertically differentiated instructional-groups in high schools. Little has been done on assignment processes and the role of background characteristics within the classroom. An exception is Eder (1979) who finds social origin effects in a qualitative study of ability grouping in a first-grade classroom. In this chapter we analyze the assignment of pupils to within-class ability groups using a large sample of classrooms and students.

The research on assignment to vertically differentiated instructional-groups both in the United States and abroad has focused primarily on the effect of social background measured by parents' socioeconomic status. This reflects the preoccupation of sociologists with social-class differences when studying inequality of opportunity. Our data provide only poor measures of parents' socioeconomic status. On the other hand, the study (to be described here) that provided the data for the present analysis was explicitly designed to maximize variation in classroom racial composition. Race, of course, has been a major concern in research on inequality of opportunity in the last half of the 20th century. Major inequalities in academic achievement and educational resources between the races are well documented and have been the focus of much concern. While some of the United States research on assignment to high school tracks has included race as a variable, little or no explicit concern has been devoted to studying the role of race in ability-group assignment.

The analysis presented here focuses exclusively on the role of race in ability-group assignment within the classroom, ignoring the role of other background characteristics of the student, in particular the students' socioeconomic background. This means, of course, that whatever race effects we find may be due, at least in part, to socioeconomic background. However, race is a visible attribute of students. The ability-group assignments are made by teachers based on the information they have at the time of the assignment. It is likely that race becomes an explicit consideration in these assignments. We, in fact, provide evidence that this is indeed the case, though the outcome of the teachers' reliance on race may be unexpected.

Our analysis differs from previous research not only by focusing on assignment to within-classroom ability groups rather than on between-classroom grouping, such as high school tracks, but also by focusing on the role of race rather than of socioeconomic background. In contrast to other research we focus major attention on the role of classroom composition and of the size distribution of instructional groups for the assignment process. Our reasoning is that a student's probability of getting assigned to a certain-level ability group, say a high group, not only depends on the characteristics of that individual student but also on the characteristics of the students he or she is competing with and on the relative sizes of the various groups. As noted earlier within-class ability groups have the rationale of allowing the teacher to work with a smaller group of children for a period of class time and of allowing the teacher to work with a homogeneous group of students in that period. These two rationales have different implications for the formation of groups and we argue later in this chapter that they in fact are usually contradictory. This means that the size distribution of groups usually is quite independent of the ability distribution of the students in the classroom from which the groups are formed. Further distributions of students will differ among classrooms both with respect to ability and achievement and with respect to race. The variation among classes in the size distributions of ability groups and in student characteristics is not adequately mirrored in the models used in most previous research that treats assignment as a function only of the individual student's ability and background, without taking into account characteristics of the organization of groups and of the student body from which groups are formed.

The first part of our analysis attempts to demonstrate the need for a more adequate model of the assignment process by showing that analyzing the assignment process in the traditional manner leads to puzzling results. We then explore the reasons for the puzzling findings by carrying out an analysis at the classroom level. The classroom-level analysis provides insights that enable us to reformulate the individual-level model, and in the last part of the analysis, we show that this reformulated model provides more satisfactory results.

The results we report concerning the role of race in ability group assignment may be peculiar to our sample and perhaps also the period when the data were collected. Our analysis should still be of general interest because we make a major effort to obtain an adequate model of the assignment process and because we show that satisfactory results of the analysis are strongly dependent on using an appropriate model. Our model represents an attempt at implementing an explicit conceptualization of what happens in the assignment process. With respect to the choice and the measurement of variables it departs from how assignments have been analyzed in previous research.

Data and Methods

Our data come from a longitudinal study of students in 48 classes of elementary-school children in Northern California. These classes include 10 fourth grades, 12 fifth grades, 10 sixth grades, 5 seventh grades and some combined grades. The mean class size was

30.7 with a standard deviation of 5.8. Data on a total of 1477 students were obtained for the study.

Schools were selected partly on the basis of racial composition. Several of the classes were in two all-black schools while others were in schools with low or no black enrollment. The 1477 students in the sample included 658 blacks (44.5%), 697 whites (47.2%), 75 Asians (5.1%) and 47 Chicano students (3.2%). Our concern in the analysis to follow is with black–white differences. Classroom racial composition turns out to be of major importance for the assignment process. Because there are so few Asians and Chicanos, we cannot adequately measure the classroom composition with respect to these ethnic groups. For this reason Asians and Chicanos have been coded as nonblacks. The black students appear to come primarily from lower- and lower-middle-class families. Most other students came from lower-middle- to upper-middle-class backgrounds. These impressions are based on what we know about the neighborhoods of the schools. Because of this apparent association between race and family background, it is likely, as noted earlier, that the race effects we may observe are due partly to family background.

Information on within-classroom instructional groups was obtained from the teachers of the 48 classes six times over the school year. The teachers were asked to provide the names of students in each reading and mathematic group at each data collection, to report the basis on which groups were formed, and to report the percentage of instructional time students spent in these groups.

Reading groups were established for all or a large segment of the instructional time in 34 classrooms. Mathematic groups were created in 21 of the 48 classrooms. Because of problems in comparing mathematics achievement tests across classrooms and because fewer classes have mathematic groups, we restrict the analysis to reading groups. Of the 34 classes with reading groups, ability was explicitly mentioned by the teacher as a basis for group assignment for 24 classes. In 8 classes teachers provided no information on group criteria, but the test scores of students in the reading groups in these classes provide clear evidence for ability grouping. In the remaining two classes one was said by the teacher to be grouped to obtain heterogeneous ability groups; in the other the teacher varied the grouping criteria over the year. We have excluded these two classes from our analysis. One more classroom was removed from the analysis because of too many missing observations. This leaves us with 759 students in 31 classrooms. A description of some characteristics of these classrooms is provided in a later section of this chapter.

The 759 students in the sample exclude students with missing data on reading achievement and race. Overall 10% of the students and parents refused to participate in the study. Nonrespondents seem not to differ from respondents with respect to race and gender. They also appear to be fairly randomly distributed across classrooms and reading groups.

For the individual-level analysis in the next and in the last section of this chapter, we further exclude students from all-nonblack and all-black classrooms. Clearly, race cannot have an effect in these classes. This leaves us with 576 students for the individual-level analysis.

We have reported elsewhere (Hallinan & Sørensen, 1981) a fairly extensive description and analysis of the formation and stability of reading groups in this sample. We find that classes have from 2 to 5 groups with a mean of 3.1 groups. The size of the groups varies somewhat with a mean of 10.48. The standard deviation is 4.54. We show that the size distribution does not reflect an attempt by the teacher to optimize within-group homogeneity in ability. There appears to be a tendency to equalize group sizes given the number of groups the teacher chooses to establish (Hallinan & Sørensen, 1981). The tendency toward equal-sized groups and the restricted range of the number of groups mean that the size distribution of ability groups appears to be quite independent of the achievement distribution in the classroom. This does not mean that there is no variation in the size distribution among classrooms. There is some, and as we show here later, the covariation between the size distribution and other classroom characteristics is important for the assignment process and the observed effects of race on assignments.

We subsequently analyze here the initial assignment of students to ability groups at the start of the school year. However, the reading groups are very stable over the school year with little change either in size or in student composition (Hallinan & Sørensen, 1981). The reason they are stable, we have argued, is that the teachers' wish to work with a small number of equal-sized groups constrains the ability to move students from one group to another. In fact, what little mobility there is further increases the tendency toward equal-sized groups.

Students were administered standardized achievement tests at the beginning (and in most schools also at the end) of the school year. The tests include the California Test of Basic Skills (CTBS), Science Research Associates (SRA), the Iowa Test of Basic Skills (ITBS), and the Metropolitan Achievement Test (MAT). A composite raw score in reading and mathematics was obtained for all students who took the test. In order to compare the test scores across schools, the composite reading scores for the MAT, SRA, and ITBS were transformed into equivalent scores on the CTBS according to procedures developed in the Anchor Test Study (Loret, 1974). Similar transformations for mathematics scores were not derived and this is one reason why we focus on reading groups in this analysis.

The students' grade-equivalent reading scores form one main independent variable in our analysis. We perform further transformations of these scores as explained in the analysis. The other main independent variable is race. In addition we use as independent variables various classroom characteristics, such as racial composition, and characteristics of the grouping arrangements (such as the size distribution of groups).

Grouping assignment could be analyzed treating the assignment as a polytomous dependent variable. Using such a variable would be very cumbersome because the number of groups differ among classrooms; moreover, the analysis would provide much redundant information. Therefore, we focus instead on the probability of being assigned to a high group as the dependent variable. This variable is coded as a binary variable for all students in classes with reading groups. On a couple of occasions, we provide information on the assignment of students to low groups. But, as one may expect, this process is almost completely symmetric to the high group assignment.

Because our dependent variable is dichotomous we use logit analysis on individual-level data (see, e.g., Hanushek & Jackson, 1977). The use of the logit model overcomes the well-known problems of inefficiency and poor fit of the functional form created by the use of ordinary least-squares estimation of a linear model for the probability of being assigned to a high group. The coefficients to be reported in our analysis can be interpreted as measures of effects of the various independent variables on the dependent variable. However, in the logit model, the dependent variable is the *logit*, or the logarithm of the odds of getting in the high group. This form of the dependent variable may hinder a straightforward interpretation of the magnitudes of these coefficients. In this analysis we are mostly concerned about the statistical fit of the various models, and absolute sizes of the coefficients are of less concern. In particular no attempt is made to compare relative magnitudes of effects for variables measured in different metrics.

First, our analysis straightforwardly addresses the question of whether race has an effect on assignment to a high group, controlling for student achievement. Here, we use a model that sees assignments as determined by achievement and the student's race, but ignores information on the organization of ability groups in the student's classroom. This analysis therefore is similar to how the effect of a background characteristic on assignment has been analyzed in other research.

The Effect of Student Race and Achievement on Ability-Group Assignment

As noted previously, it is common to study the impact of student ascriptive-characteristics (such as race or social origin) on assignment to vertically differentiated instructional groups, using a control for student achievement. If an effect of origin or race is found, controlling for achievement, some form of discrimination or bias is inferred. We use the same strategy here. However, even disregarding the preceding problem of adequately representing what goes on in the assignment process, the strategy does not produce results that can be unambiguously interpreted. Teachers or school administrators who make these assignments have the objective, we assume, of creating groups that are homogeneous with respect to student aptitude and preparation for the material to be taught. They rely on information and insights that are usually not available to the researcher (for an exception see Eder, 1979). It may of course be the case the teachers succeed in their objective of creating homogeneous groups even when a net effect of origin or race is established. The achievement measure may well be a fallible measure of student aptitude and preparation. The teacher's measure may be better, or worse. So, a net effect of origin and race cannot be interpreted to mean that teachers are biased or prejudiced, and it is possible that they are doing a better job than the achievement scores imply they do. In our case it should also be noted that the teacher could not have established a perfect association between achievement scores and assignments since achievement was measured at the same time or shortly after the assignments took place.

These ambiguities imply that we should be cautious in interpreting the meaning of observed net effects of origin or race on assignments, regardless of how satisfactory our results are statistically. We may exaggerate the handicaps encountered by students from different backgrounds by using the measures typically available. But, there is also a possibility that we may underestimate the handicaps. Assignments are usually correlated over grades and school levels. If these assignments produce the intended effects on achievement, initial handicaps due to biases and prejudice may have long-term effects that are cumulative and at the same time increasingly difficult to detect as net effects of origin and race, because achievement becomes endogenous to origin and race.

Table 1 presents estimates from logit models of the probability of being assigned to a high group with only the student's race and his or her reading achievement in the beginning of the school year as independent variables.

We first show in Model 1 that race has an overall effect on ability-group assignment in favor of nonblacks. The coefficient to race is clearly significant. However, Model 2 shows that this effect of race on assignment apparently is due to an association between race and achievement. Exclusive of reading achievement, there is no significant effect of race. So, the impression of nonblacks having an advantage for assignment to high-ability groups seems to be due to their superior reading achievement.

This is not the whole story—for inspection of the residuals of Model 2 suggests a fairly strong interaction between race and achievement in ability-group assignment.

TABLE 1

Logit Models of the Effect of Race and Reading Achievement on Ability Group Assignments.[a]

Independent Variables	Model 1	Model 2	Model 3
CONSTANT	−1.527 (.299)	−1.957 (.316)	−3.981 (.959)
RACE	.557 (.180)	.018 (.209)	−1.208 (.561)
GRER1		.253 (.047)	.731 (.217)
RACE*GRER1			−.269 (.118)
Chi-square	730.3	699.8	694.3
df	574	573	572

[a] Dependent variable is probability of getting into a high group. Standard errors in parenthesis.

Race is coded: Black = 1, White = 2. GRER1 is grade equivalent reading achievement score at beginning of school year. RACE*GRER1 is interaction between race and reading achievement. Only students not in all black and all nonblack classrooms are included. *N* = 576.

This interaction term is included in Model 3. It is significant and has a negative sign. This presumably means that high-achieving nonblacks have a significantly lower chance of getting into a high-ability group than their achievement alone would imply. Correspondingly low-achieving blacks have a higher chance of being assigned to a high-ability group than their achievement by itself would imply. Model 3 also shows that with the inclusion of the interaction term, the main effect of race again becomes positive and significant, in favor of nonblacks. While nonblacks have an overall advantage in assignment to high-ability groups, there is some attempt by teachers to reduce this advantage by favoring low-achieving blacks and reducing the advantage of high-achieving nonblacks.

One variable that may be suggested as a candidate for clarifying the reason for this unexpected finding is classroom racial composition. It may well be that there are differences between predominantly nonblack and predominantly black classrooms that would produce the results of Table 1. In Table 2 we therefore add the racial composition of the classroom as an independent variable.

Model 4 of Table 2 shows that the racial composition of the classroom has a quite strong significant effect on ability-group assignments. However, the incorporation of racial composition does not much affect the operation of the other variables, including the significance of the interaction between race and achievement. The effect of classroom composition in Model 4 is positive, meaning that all students in classes with many black students have a greater chance of getting into a high-ability group. It would seem possible that this effect interacts with race, so that blacks would be more favored in black classes. The interaction term between race and racial composition is included in Model 5. It has the correct sign, but it fails to reach significance. All students have

TABLE 2

Logit Models of the Effects of Achievement, Race, and Classroom Characteristics on Probability of Being Assigned to a High Group.[a]

Independent Variables	Model 4	Model 5	Model 6
CONSTANT	−5.904 (1.131)	−5.996 (1.453)	−2.546 (1.521)
RACE	2.007 (.615)	2.058 (.793)	1.794 (.809)
GRER1	.783 (.221)	.786 (.223)	1.167 (.247)
RACE*GRER1	−.292 (.120)	−.293 (.121)	−.372 (.130)
PCBL	1.389 (.407)	1.521 (1.368)	1.544 (1.389)
RACE*PCBL		−.083 (.826)	.385 (.865)
GRADE			−.890 (.128)
Chi-square	682.1	682.1	623.7
df	571	570	569

[a] Standard errors in parenthesis.

PCBL is percent black in the classroom. GRADE is grade level. PCBL*RACE is interaction between race and racial composition of class. For definition of other variables see Table 1. $N = 576$.

a higher probability of being assigned to a high group in predominantly black classrooms.

The achievement measure we use is a grade-equivalent reading-achievement score. We have classes ranging from Grade 4 to Grade 7, as noted previously. It is possible that the use of grade-equivalent scores with this range of grades may have affected our results. For this reason we include the grade level as an independent variable in Model 6. It has a significant negative effect. All students have a higher probability of being assigned to a high group in lower grades. However, as with racial composition, the inclusion of grade level does not explain the basic results of Model 3 of Table 1: the main effect of race and the interaction term is not affected by the inclusion of these classroom characteristics in the model.

There appear to be quite strong race effects on the assignment to ability groups exclusive of measured reading achievement. The main effect of race is in favor of nonblacks, but this effect is modified by a negative interaction effect that suggests that reading achievement is used differently by teachers for blacks and for nonblacks.

These race effects are difficult to interpret. The main effect of race in favor of nonblacks could mean that there is some unmeasured variable that acts as an assignment criterion. Nonblacks have higher values on this variable and therefore have an advantage. On the other hand, teachers appear to use reading achievement differently for the two races to reduce the advantage of nonblacks. We cannot establish whether the unmeasured assignment-criterion also is used differently for blacks and for nonblacks. Hence, the nature of the racial preferences that may operate in these classrooms remains unclear after this analysis.

In addition, there is clearly something about classroom racial-composition and grade level that affects ability-group assignments. The results suggest that there is some relationship between the outcome of the assignment process and the size distribution of ability groups. But we have not incorporated the relative sizes of the ability groups directly into the analysis. More clearly interpretable results should be obtainable if we directly measure the organization of ability groups. In fact, it is possible that the unmeasured variables that seemed to account for the race effects are related to ability-group organization. Not incorporating variables that reflect characteristics of the ability-group organization may have resulted in the use of misspecified models in Tables 1 and 2. Misspecified models are not likely to produce meaningful results. To obtain more insights into how classrooms differ in the assignment process and to obtain a better-specified model, we next investigate the classroom-level processes.

Classroom-Level Analysis

The formation of teacher-led ability groups within a classroom has the two main rationales mentioned previously. One is to enable the teacher to work with students who are homogeneous with respect to their aptitude and their preparation for the material to be taught. The other is to reduce inattention and to facilitate the management of the instructional group. This may be a particularly important rationale with respect to reading groups, where reading aloud is a main pedagogical device. The combination of these two rationales in within-classroom ability-groups poses a dilemma for the teacher. The two rationales are in fact contradictory. Creating homogeneity of groups implies that the size distribution of groups mirror as closely as possible the distribution of aptitude and preparation among the students in the classroom. This should result in groups of unequal sizes (except in the unlikely situation where the ability distribution is uniform) and a distribution of number of groups that reflects the heterogeneity of the student body from which groups are formed. On the other hand, reducing inattention and facilitating management are best obtained when groups are of roughly equal size. Although in principle, equal size may occur when groups are small and numerous, so that homogeneity also could be achieved, teachers are restricted with respect to how many groups they can create if a meaningful period of time is to be spent with each group in a class period.

Groups are formed at the beginning of the year when the teacher may have somewhat imprecise information about the ability distribution of the class. Management considerations are important. For these reasons, management considerations should prevail and the size distribution of ability groups should be only weakly related to the ability distribution in the class. Few and roughly equal-sized groups should occur regardless of the composition of the class. This indeed appears to be the case (Eder, 1979; Hallinan & Sørensen, 1981). The size distribution of groups is only modestly related to the classroom student-body composition and there is a strong tendency toward equal group-sizes.

These organizational constraints on ability-group formation have important implications for the assignment process. Rather than conceiving of assignment to a group as a question of the student's ability seen in isolation and of whatever biases the teacher has, the assignment is one more properly seen as an allocation process to a set of places in groups where the sizes of the groups are predetermined. This means that a student's chance of getting into a high group should crucially depend on the size of the high group. Further, it will not be a student's absolute achievement-level that determines the assignment, but rather the ability- or achievement-level relative to the student's peers. In other words, we should expect that a student's chance of getting into a high group is greater the larger the high group. It is also greater the higher the student's ability relative to the student's peers in that classroom, which does not preclude that the student's ability-level may be quite low relative to students in other classes.

These, perhaps elementary, considerations are not implemented in the models estimated in Tables 1 and 2. These models did not take into account between-classroom variation in the sizes of the high groups. Also, in these models a student's achievement is compared to the achievement of all students in the sample rather than just to his or her classroom peers. This means that the models in Tables 1 and 2 could be misspecified.

We can get information about the seriousness of the problem by comparing the sizes of high groups in different classrooms and by studying the between-classroom variation in achievement.

The mean size of the high group for the 31 classrooms is 9.26 with a standard deviation of 4.6. This represents considerable variation, making it dubious that the implicit assumption of constant group-size of the models in Tables 1 and 2 is correct. What is at issue here, however, is not the absolute size, but the relative size of the high groups, that is, the proportion of the class in the high group. The mean of the relative size of the high group is .303 with a standard deviation of .136. The variation is still considerable.

We introduced two classroom variables in the previous analysis: grade level and racial composition. They had significant effects on the probability of getting into a high group. It is conceivable that their effects reflect a correlation with the relative sizes of the high groups. Table 3 therefore presents a comparison of the relative sizes of high groups with grade level and percentage of blacks (coded in four categories). For illustration the variation in the relative sizes of low groups is also shown.

There appears to be no systematic variation of relative group sizes with grade level that would explain the linear effect found before. However with respect to racial composition, there is a pattern. All nonblack classes have the smallest high-groups and the largest low-groups. Given the distribution of classes with respect to racial composition, this association between racial composition and relative group-size could well account for some of the effect of racial composition established earlier.

We next turn to the question of the between-classroom variation in achievement.

TABLE 3

Absolute and Relative Sizes of High and Low Ability Groups, by Classroom Racial Composition and Grade Level[a]

Classroom Racial Composition	Absolute Sizes				Relative Sizes				
	High Groups		Low Groups		High Groups		Low Groups		
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	N
0-19% Black	8.5	5.12	10.25	6.08	.274	.139	.332	.196	12
20-49%	7.75	2.75	5.25	3.20	.328	.050	.238	.143	4
50-79%	9.80	2.17	7.00	1.00	.312	.081	.222	.036	5
80-100%	10.50	5.42	8.00	4.55	.327	.178	.243	.137	10
Grade Level									
4	10.88	5.49	9.75	3.49	.346	.153	.313	.111	8
5	10.00	3.79	5.91	4.61	.334	.104	.193	.130	11
6	6.56	2.96	10.44	5.73	.225	.101	.353	.189	9
7	10.33	7.51	7.33	4.16	.319	.243	.229	.138	3

[a] Sample includes all students in ability-grouped classrooms. $N = 759$.

Computing the mean achievement within each classroom and an average of these means across classrooms, gives an overall mean of 4.37 with a standard deviation of 1.24. This shows considerable variation in mean grade-equivalent scores across classrooms. There is also marked variation in the within-classroom variances. Calculating the standard deviation of the achievement distribution in each class, and averaging across classes yields a mean standard deviation of 2.27 with a standard deviation of .66. Clearly the achievement distributions differ considerably among classrooms.

Grade level and racial composition are both significantly related to the within-classroom achievement distributions. This is shown in Table 4. A considerable amount of the between classroom variation in the means and the standard deviations of the within class achievement distributions are explained by grade level and racial composition.

The between-classroom variation in achievement distribution and the systematic relationship between this variation and classroom characteristics suggest an explanation for the results of Tables 1 and 2. The race effect, the interaction between race and achievement, and the effect of classroom characteristics could be due to the between-classroom variation in achievement distributions. The same absolute difference in achievement level between two students should have different implications for the assignment to a high group in a classroom with small within-class variation and a class with large within-class variation. It clearly seems appropriate to take this into account in the individual-level analysis. Teachers will, of course, rely on the within-class variation in the assignment criteria when making the assignments.

It is possible to study (at the classroom level) the issue of race effects on assignments taking into account both the between-classroom variation in the size of high groups and in the achievement distributions. For each classroom we know how many blacks and nonblacks were assigned to the high group. We can also calculate the number of blacks and nonblacks that should have been in the high group if reading achievement was the only factor determining the assignment. This expected number can be obtained by ranking all students in a class according to their reading achievement and then finding the achievement level that would be decisive for assignment to a high group

TABLE 4

Regressions of Classroom Means and Standard Deviations on Classroom Racial Composition and Grade Levels[a]

Dependent Variable	Classroom Means		Class *SD*	
Independent variables	*b*	*t*	*b*	*t*
CONSTANT	2.151	3.06	.861	1.65
PCBL	−2.677	7.89	−1.013	3.53
GRADE	.666	4.81	.362	4.04
R^2	.71		.44	

[a] For definitions of independent variables, see Table 2.

in a particular classroom. Comparing the expected number of blacks and nonblacks obtained this way to the actual number of blacks and nonblacks provides a measure of racial preference that takes into account variation among classes both in the size of the high groups and in the achievement distributions.

The mean number of blacks, across all classrooms, that actually were assigned to a high group is 4.35. The expected number if only reading achievement was decisive is 3.74. The difference .613 has a standard error of .186 and therefore is significantly different from zero. Table 5 also shows that in both absolute and relative terms there is a significant association between classroom racial-composition and preference for blacks exclusive of reading achievement. This effect is created in classrooms with 20–80% blacks, particularly the 50–80% black classes. In these classes there is an average of almost 19% more blacks in high groups than should be expected if only achievement were decisive. It is of course to be expected that racial preference is found to be low in classrooms that are almost all black or all nonblack. The generalizability of the finding may, on the other hand, be limited. All the classes with from 50–80% black students come from a single school.

The measure of racial preference we have established seems satisfactory. It is a classroom-level measure and thus describes variation among the teachers who perform the assignments. This is indeed appropriate. However, the measure does not describe the outcome with respect to individual students. It is possible that in the sample of students there will not be a significant race effect. It is also of interest to explore whether we can model the assignment process better at the individual level using the insights of the classroom-level analysis.

A Return to Individual-Level Analysis

We learned from the classroom-level analysis that our individual-level analysis of assignment to a high-ability group should take into account both the variation in the relative sizes of the high groups among classrooms and the variation among classrooms in the achievement distributions of the class' student bodies.

The variation in the relative sizes of the high groups is easily taken into account by forming a variable that for each classroom gives the relative size of the high group. The variation among classrooms in the achievement distribution can be taken into account by standardizing all the within-classroom distributions to a standard-unit normal-distribution, that is a normal distribution with mean 0 and standard deviation 1. The z score of these distributions, or the standard normal deviate, is a measure of achievement that compares a student's achievement to other students in the class rather than to all students in the sample.

Comparing the students to one another in the class is presumably what the teacher does when making ability-group assignments. But, the teacher is not likely to compute

TABLE 5

Actual Number of Black Students in High-Ability Groups and Number Expected if Only Achievement-Governed Assignments, by Classroom Racial Composition[a]

Classroom racial Composition	Actual Number				Expected Number				Difference			
	Frequency		Percent		Frequency		Percent		Frequency		Percent	
	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*	Mean	*SD*
0–19% Black	.017	.039	.013	.034	.000	.000	.000	.000	.017	.039	.013	.034
20–49%	1.252	.963	.187	.164	.502	.583	.069	.083	.750	1.500	.118	.224
50–79%	5.601	2.413	.594	.302	3.804	2.391	.407	.283	1.800	.837	.189	.084
80–100%	10.004	5.943	.907	.162	9.503	5.825	.869	.193	.500	1.080	.038	.107
Overall	4.355	5.54	.412	.425	3.742	5.38	.355	.415	.613	1.02	.063	.118

[a] N = 759.

z scores for the occasion. Instead, as we have argued elsewhere, the students are likely to be ranked and these rankings used to determine ability group assignments (Sørensen & Hallinan, 1982). This use of rankings follows from our conception of the assignment process as an allocation process to groups where the number and sizes of groups are determined quite independently of the actual ability-distribution in the classroom. We can capture this use of ranking by computing from the individual *z* scores the corresponding percentiles and use this measure as our achievement measure.

With these new variables and changes in metrics we reestimate some of the models of Tables 1 and 2 in Table 6.

Model 6 of Table 6 is a reestimate of Model 2 of Table 1 using the student's *z* score rather than the grade-equivalent reading-score, unstandardized by classroom, that was used in Model 2. The *z* score produces the same nonsignificant race effect as Model 2, but it provides a marked improvement of fit. The chi-square of Model 6 is 638.6 as compared to 699.8 of Model 2 with the same degrees of freedom. An even better fit is obtained using the percentile, *P*. With this measure of achievement the chi-square becomes 634.5. Clearly, the use of standardized achievement-distributions and the percentile measure to capture the use of rankings improves the model.

Model 9 now introduces the measure of the relative size of the high group. Again a marked improvement of fit is obtained. Model 10 attempts to complete the analysis by introducing the classroom characteristics of racial composition and grade level. Model

TABLE 6

Logit Models of Effects of Race, Adjusted Achievement, and Classroom Characteristics on Assignment to High Group[a]

Independent Variables	Model 7	Model 8	Model 9	Model 10	Model 11
CONSTANT	−1.359 (.322)	−3.475 (.405)	−2.115 (.444)	−2.562 (1.265)	−3.260 (.707)
RACE	.194 (.198)	.186 (.199)	−.228 (.220)	.032 (.692)	.311 (.352)
Z	1.257 (.148)	4.194 (.475)	5.361 (.550)	4.532 (1.727)	
P			1.453 (.183)	1.467 (.208)	5.176 (.563)
PCHI				.380 (1.031)	1.427 (.188)
RACE*P				.899 (.504)	
PCBL				−.039 (.121)	
GRADE					
PBL(2)					.279 (.328)
PBL(3)					.882 (.369)
PBL(4)					.658 (.421)
Chi-square	638.6	634.5	557.9	554.6	552.1
df	573	573	572	569	569

[a] Chi-square for Model 11 + RACE and PBL interactions is 549.4, *df* = 566.

Z is *z* score for within class standardized achievement distribution. P is percentile corresponding to Z. PCHI is percent in high group. RACE*P is interaction between RACE and P. PBL(2) is 20–49% black, PBL(3) is 50–79% black, PBL(4) is 80–100% black. Only students not in all black or all nonblack classrooms are included: *N* = 576.

10 also incorporates the interaction between race and achievement that was so striking in Model 4 of Table 1. None of these additional variables reaches significance. It is pleasing that the interaction term disappears, for it shows the importance of working with within-classroom distributions in problems of this kind. The apparent interaction that seemed to reduce the advantage high-achieving nonblacks or favor low-achieving black students observed in Table 2 was then an artifact of not taking into account the within-classroom achievement distribution and the size distribution of the ability groups.

Most importantly, the main effect of race that appeared in the earlier analysis after the inclusion of the interaction term, now is not present. By taking into account the within-classroom distribution and the size distribution of ability groups we have accounted for the difficult-to-interpret effects found earlier. We do not have to explain race effects by references to some unmeasured assignment criterion that is modified by a differential use of reading achievement for the two races. The poorly specified models of Tables 1 and 2 produced an artifact.

It is surprising that racial composition has no significant effect in the individual-level analysis. Our classroom-level analysis appeared to show an effect of racial composition on misassignments, one that worked in favor of black students. Table 5 did show that the pattern was not linear. For this reason we introduce in Model 11 a set of dummy variables for racial composition, where racial composition is coded as in Table 4. The result is that there appears to be some effect of racial composition on assignments. The effect seems to be due to the 50–80% black category. This may, as noted, be an effect unique to a particular school.

Model 11 shows that there is something about racial composition that affects ability-group assignment. Presumably, teachers in these classes are paying attention to something other than reading achievement when making assignments. However, in contrast to the classroom-level analysis we cannot establish that this something is used to favor black students. There is not a significant interaction between class racial-composition and race. The chi-square for a model that introduces the interactions between race and the racial composition dummies is 549.4 for 566 degrees of freedom. This is not a significant improvement of fit over Model 11, but there appears to be an inconsistency between the two levels of analysis.

The probable explanation is the following. The classroom level analysis showed that if achievement was the only criterion for assignment, fewer blacks would be assigned to high groups in certain classrooms. The individual-level analysis shows that there is something in addition to achievement that influences assignment in certain classrooms. This unknown factor is not used to directly discriminate against nonblacks—meaning that the unmeasured criterion is applied in the same way to blacks and nonblacks (otherwise the interaction between race and racial composition dummies would have been significant at the individual level). However, if this factor tends to be used in classes with majority-black students, black students will benefit from it. This explanation is consistent with both sets of results, if, in addition, we make some allowance for the differential statistical sensitivity of the two analyses.

Conclusion

The main conclusion of our analysis is that there appears to be no direct individual-level effect of race on ability-group assignments, but that race influences the formation of ability groups. High-ability groups tend to be larger in racially mixed classrooms and this gives black students an increased chance to get into high groups. White students have the same advantage in these classrooms, so the phenomenon cannot be said to represent overt discrimination against nonblacks. Further, there appears to be a criterion additional to reading achievement used in racially mixed classrooms in the assignment process. We cannot detect in the individual-level analysis that this criterion is used differently for black and for white students. The use of the criterion will increase the probability that a black student will be assigned to a high group when blacks are in the majority, even if it is used the same way for blacks and for nonblacks. Hence, more blacks (on the average) are assigned to high groups at the classroom level than the sole use of reading achievement would predict. This is a second indirect effect of race. Race, in sum, affects the way teachers organize instructional groupings and the criteria they use. We have not found evidence that race overtly became a criterion for the assignment to ability groups. Exclusive of reading achievement, measured in the appropriate metric, and of relevant characteristics of classroom organization, race has no effect.

The consequences of the impact of racial composition on ability-group formation are unclear. We have shown in another analysis (Sørensen and Hallinan, 1982) that assignment to a high-ability group has some positive effect on growth in academic achievement. However, this analysis also shows that there is a strong negative effect of the size of the reading group on growth in achievement. On balance, therefore, the impact of race on the assignment process may have no impact on achievement.

A second main conclusion from this analysis is that the use of models that attempt to adequately mirror the process under investigation has considerable benefits. The conventional models used in Tables 1 and 2 produced results that were dramatic, but not satisfactory. Only when achievement was adequately measured and the appropriate classroom-characteristics were taken into account, did meaningful results emerge.

References

Alexander, K. L., & McDill, E. L. Selection and allocation within schools: Some causes and consequences of curriculum placement. *American Sociological Review*, 1976, *41*, 963–980.

Barker Lunn, J. C. *Streaming in the primary school*. London: National Foundation for Educational Research in England and Wales, 1970.

Douglas, J. W. B. *The home and the school*. London: MacGibbon & Kee, 1964.

Eder, D. J. *Stratification within the classroom: The formation and maintenance of ability groups*. Unpublished dissertation, University of Wisconsin at Madison, 1979.

Hallinan, M. T., & Sørensen, A. B. *The formation and stability of instructional groups.* Paper presented at the American Sociological Association meeting, Toronto, 1981.

Hanushek, E. A., & Jackson, J. E. *Statistical methods for social scientists.* New York: Academic Press, 1977.

Hauser, R. M., Sewell, W. H., & Alwin, D. F. High school effects on achievement. In W. H. Sewell, R. M. Hauser, & D. L. Featherman (Eds.), *Schooling and achievement in American society.* New York: Academic Press, 1976.

Heyns, B. Social selection and stratification within schools. *American Journal of Sociology*, 1974, *79*, 1434–1451.

Husen, T. The effect of school structure on the utilization of talent. In *Social objectives in educational planning.* Paris: Organization for Economic Cooperation and Development, 1967.

Jackson, B. *Streaming.* London: Routledge & Kegan Paul, 1964.

Loret, P. G., *Anchor test study: Equivalence and norms table for selected reading achievement tests.* Berkeley, California: Educational Testing Service, 1974.

Rosenbaum, J. E. *Making inequality: The hidden curriculum of high school tracking.* New York: Wiley, 1976.

Schafer, W. E., & Olexa, C. *Tracking and opportunity.* Scranton: Chandler, 1971.

Sørensen, A. B., & Hallinan, M. T. *Student diversity and instructional grouping.* Paper presented at the American Education Research Association, Los Angeles, California, 1981.

Sørensen, A. B., & Hallinan, M. T. *Effects of ability grouping on growth in academic achievement.* Unpublished paper, Wisconsin Center for Education Research, University of Wisconsin at Madison, 1982.

Wilcox, J. A search for the multiple effects of grouping junior high school students. *Peabody Journal of Education*, 1961, *41*, 216–225.

III

The Processes of Instructional Groups

CHAPTER 7

Frameworks for Studying Instructional Processes in Peer Work-Groups*

SUSAN S. STODOLSKY

Overview: Instructional Forms in Classrooms

In this chapter I consider questions about the uses of instructional groups in classrooms. A conceptual framework is presented first. The framework is a general view of the causes and consequences of instructional forms in classrooms. Instructional forms are seen both as producers of outcomes and as outcomes themselves. The framework provides a perspective that may be useful for examining any instructional arrangement.

The specific focus of the chapter is the use of instructional groups in classrooms, particularly peer work-groups. A typology of instructional groups is provided, as is a review of studies of the actual occurrence of various group arrangements in today's schools. With the general framework and descriptive studies as background, I delineate some questions about factors that affect the internal dynamics and outcomes of peer instructional-groups. The questions are posed in connection with pertinent theory and research.

In my analysis of instructional arrangements I assume that instructional forms must be viewed both as producers of outcomes and as outcomes themselves. Also, instructional arrangements and decisions lead to both intended and unintended consequences encompassing student learning and other effects such as the development of attitudes and social perceptions. Once teachers and children function within particular instructional conditions, certain achievement, attitudinal, social, and socialization outcomes result. Some of these results are planned and desired; others are not.

---

*This paper was written at the request of the Wisconsin Center for Education Research and support was provided by the Center. Additional support was provided by NIE Contract P-79-0081 to the author and to the Educational Finance and Productivity Center, Department of Education, University of Chicago. Sarah T. Patton and Christa Winter provided research assistance.

THE SOCIAL CONTEXT OF INSTRUCTION
Group Organization and Group Processes

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.

ISBN 0-12-552220-7

Instructional arrangements are not accidental creations. Many forces may affect the classroom procedures and activities used by a teacher. As we identify such forces, it becomes clearer that educational arrangements are themselves outcomes that are multiply determined and constrained.

In viewing instructional arrangements as outcomes I mean that various macro-level forces, as well as teacher preferences and values, pedagogical fashion and training, and resource availability, constrain instructional activities. The particular type of classroom, the children who comprise the class, the subjects to be taught and school policies about instruction also significantly influence classroom practice. Also, the perceived success or failure of an educational arrangement contributes to decisions to maintain or alter an instructional approach.

Forces that may influence the creation and use of instructional arrangements include the social and economic features of the district or community in which a school is situated. Parental preferences and values (Wimpelberg, 1981) and school policies and philosophies (Ferguson, in preparation) impact directly and indirectly on instructional decision-making. Other macro forces arise in the sociopolitical climate and the public's view of the state of education. Swings of public concern about educational issues can affect activities in classrooms. Recent examples include "back-to-basics" pressures and the mandating of career education.

Two factors that seem potent in shaping instructional arrangements are currently under study. Classroom composition is being viewed from a sociological perspective by Barr and Dreeben (1980) and Dreeben (Chapter 5, this volume) and I have been studying the impact of subject matter on classroom ecology (Stodolsky, 1981). I briefly discuss these two factors as a way of illustrating some mechanisms that shape instructional arrangements.

The composition of a classroom, a decision made at the school level, establishes the student diversity with which a teacher must work toward achieving educational outcomes. Barr and Dreeben (1980) have shown that ability distributions in first-grade classes are related to decisions teachers make about the creation of instructional reading-groups. The number of children a teacher teaches, their ability distribution, and curricular expectations and objectives all impact on instructional decisions about the utilization of time, space, and materials in pursuing optimal educational results. As Dreeben (Chapter 5, this volume) indicates, the range of ability and the number of low-ability children in a class relate to the configuration of reading groups formed. He posits that teachers' decision making is influenced by their perception of these classroom composition features.

Subject matter is also a powerful determiner of the conduct of instruction. The requirements of learning certain subjects, a subject's perceived importance and value, whether a subject is sequential in nature, and traditions associated with teaching in different areas all seem to contribute to observable differences in instruction. For example, at the first-grade level, reading is almost always taught with within-class grouping whereas math is often taught to the whole class despite the novice status of first-graders in both subjects and documented variation in achievement among children. In our research at the fifth grade (Stodolsky, 1981) we find virtually every classroom-ecology variable to differ in math and social studies classes. Children's experiences in the two subjects are markedly different. A consistent finding is that social studies instruction has more variety and diversity within and across classes than does mathematics.

Although the forces that shape instructional arrangements are a fascinating topic, in this chapter I do not emphasize how instructional arrangements come to be created. Rather, I am concerned with the intended and unintended effects of instructional arrangements once in operation. Special emphasis is placed on the circumstances under which a particular type of arrangement, peer work-groups, can have maximal impact. To do this, analyses of instructional forms in operation (dynamics) are needed.

The approach taken to understanding the intended and unintended effects of instructional arrangements builds in part on the general theory of social knowledge proposed by Berger and Luckmann (1966). I assume that the *form* of instruction and the settings in which children work produce knowledge *about* learning, along with the planned achievements in content areas. For example, if teachers always introduce new materials and concepts to children, the children may come to assume that adult explanation is a necessary part of learning in that curricular area. On the other hand, the utilization of written resources, television, or computers could produce different conceptions of the learning process, including whether a particular subject is seen as easy or hard to learn (Salomon, 1982).

The type of educational arrangements children experience have obvious as well as subtle effects, which may influence their ability to perform in other learning or assessment contexts. Shapiro (1973) found that children in an informal educational program were less able to deal with the task demands of a standardized test than were traditionally educated children, even though the content of the test was presumed within their grasp. Prior forms of educational experience and assessment had taught these children certain skills that did not transfer well into the new context. Such effects were also operating for the traditionally educated children. The children's expectations about their role and that of adults, their idea of what constitutes right answers, and other conceptions were all partially shaped by their history of experience in a certain type of educational environment. Similar patterns have been noted in persons trained in systems that rely on essay exams rather than multiple-choice tests (Madaus, Airasian, & Kellaghan, 1980). Experiments on learning sets (Luchins, 1942) are indicative of the same type of transfer problem.

Educational researchers are beginning to document the broader impact of educational settings and their components on children's learning, as well as the impact on behaviors and attitudes. Bossert (1979) has shown that sociometric choices of elementary school children are affected by classroom instructional arrangements. He found that children in teacher-centered classes where whole-class recitations were stressed tended to choose friends along achievement lines, conforming to the teacher hierarchy and centrality of academic achievement in the classrooms. On the other hand, children in classes organized with small-group work and self selection of activities did not use achievement as a criterion for sociometric choices. Blumenfeld, Hamilton, Bossert, Wessels, and Meece (1983) are investigating the relationship between classroom experiences and children's development of self-perceptions, and Rosenholtz and Wilson (1980) have studied the development of perceptions of ability in classroom contexts. Cohen (Chapter 10, this volume) has documented conditions in a bilingual classroom that produce certain patterns of work interactions. Mehan (1979) and Minuchin, Biber, Shapiro, and Zimiles (1969) have also researched consequences stemming from different curricular arrangements.

Another class of effects that result from cumulative experiences with instructional arrangements is that students learn the ways to function within the particular task or activity form. Presumably experience with recitation formats or peer-group structures or tutoring facilitates future student performance in similar settings. This directs our attention again to the idea that instructional arrangements teach and socialize children in both their content and their forms. Children learn to do worksheets or to write essays by learning both the content of a particular assignment and such format considerations as how to set up a page, how to use time, what the teacher is likely to expect as a product, and so on.

As students learn content and ways of functioning within instructional forms, they also learn the *meaning of learning* as defined in their environment. Many facets of learning might be identified in an examination of the impact of task form and content on children's ideas about learning. For example, children's interest, perceptions of ease of learning, and conditions or resources thought necessary for learning might be affected by task experiences. Doyle (1977) has described some of this learning as directed to performance for grade exchanges. In a given setting the student detects behaviors and products that will attain rewards for him.

Obviously, instructional arrangements also contribute to the planned achievements of students. Academic learning goals are usually stressed, but sometimes objectives in the affective, social, moral, and physical domains are included. Our analysis suggests that instructional decisions that lead to classroom practices for achieving cognitive goals may simultaneously produce certain social or other goals (see Cohen, Chapter 10, this volume). Conversely, classroom activities might be planned for social goals yet also have cognitive and other consequences.

As I move to a more focused analysis of instructional groups in classrooms, consideration of outcomes is not restricted to traditional cognitive achievement. Multiple goals should be examined in instructional research. Educators often desire some combination of goals but explicitly recognize that there may be no way of simultaneously maximizing achievement of them all.

The general conceptual framework presented to this point is depicited in Figure 1. In examining this figure it is possible to recapitulate and elaborate the conceptual

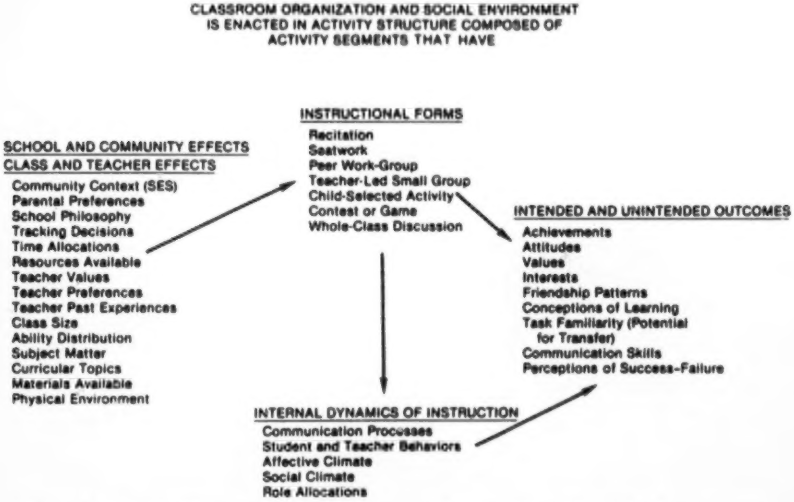
CLASSROOM ORGANIZATION AND SOCIAL ENVIRONMENT
IS ENACTED IN ACTIVITY STRUCTURE COMPOSED OF
ACTIVITY SEGMENTS THAT HAVE
SCHOOL AND COMMUNITY EFFECTS
CLASS AND TEACHER EFFECTS
Community Context (SES)
Parental Preferences
School Philosophy
Tracking Decisions
Time Allocations
Resources Available
Teacher Values
Teacher Preferences
Teacher Past Experiences
Class Size
Ability Distribution
Subject Matter
Curricular Topics
Materials Available
Physical Environment
INSTRUCTIONAL FORMS
Recitation
Seatwork
Peer Work-Group
Teacher-Led Small Group
Child-Selected Activity
Contest or Game
Whole-Class Discussion
INTENDED AND UNINTENDED OUTCOMES
Achievements
Attitudes
Values
Interests
Friendship Patterns
Conceptions of Learning
Task Familiarity (Potential for Transfer)
Communication Skills
Perceptions of Success-Failure
INTERNAL DYNAMICS OF INSTRUCTION
Communication Processes
Student and Teacher Behaviors
Affective Climate
Social Climate
Role Allocations

Figure 1. Conceptual framework for analyzing causes and consequences of instructional arrangements.

approach. A sequence that has certain reciprocal and feedback paths is presented in Figure 1.

The first column lists a variety of factors that may influence instructional decisions. Factors at the school and community level and the classroom and teacher level are included. For example, school philosophy and tracking decisions, as well as the educational backgrounds of parents in the community, are school- and community-level features. The particular subject matter, the teacher values, preferences, and prior experiences, and the class size are classroom-level variables. These factors in some combination contribute to a teacher's decisions to create a certain classroom organization and classroom social-environment, which we label the classroom activity-structure (Stodolsky, 1981). In Figure 1 a nonexhaustive list of instructional forms found in activity structures (recitations, seatwork, peer work groups) is given. Instructional forms used in activity segments provide an operational focus for analyses of instructional arrangements.

Internal dynamics of instruction can be observed within and across instructional segments in a classroom. Dynamics of instruction can be a focus for study in their own right (as in sociolinguistic research) or can be seen as mechanisms that produce educational outcomes (as in process–product research). Of particular importance are the dynamics listed in Figure 1, which include communication processes between teachers and students, communication among students, other behaviors of teachers and students, and the affective and social climate of the setting or segment. The internal dynamics of instructional settings are partly shaped by the instructional form as well as other factors, only some of which are depicted in Figure 1.

The last column in Figure 1 lists classes of intended and unintended outcomes that might result from children's immediate and longer-term involvement with various instructional forms. The major classes of such outcomes and some rationale for their inclusion was presented earlier. Actual educational outcomes and the teacher's judgments about the success and/or efficacy of a learning experience will in some measure predispose the teacher to use similar or different forms in the future. Similarly, children's participation in instructional forms will be affected by their prior experiences with them.

With the general framework as background, I now turn to the more specific focus of this chapter: instructional groups in classrooms.

Instructional Groups in Classrooms

In order to consider instructional groups in classrooms it is necessary to clarify the types of arrangements subsumed under this label. A typology of face-to-face instructional groups is presented in the succeeding section for this purpose. A defining attribute of the groups in the typology is that they contain less than the whole class as members. After the major variants are described, I look at the occurrence of instructional groups in elementary schools today.

A major distinction must be drawn between teacher-led groups and peer instructional-work-groups. A teacher-led group is usually composed of a subset of children in a class thought to have a common instructional need. The most common example is the primary reading-group. Children in teacher-led groups are expected to monitor and participate in the action of the group, but peer interaction is not a significant part of teacher-led groups. Communication is almost exclusively between the teacher and individual children. In the teacher-led group, as in whole-class teacher-directed instruction, the teacher is usually viewed as the chief learning and teaching resource. In fact, it is probably true that the teacher is seen as more essential (and conversely the children are seen as even less useful as learning aides for one another) in the small ability-group than in the whole class where more diversity is assumed and occasionally utilized.

In contrast, varying levels of interaction and exchange among children are a key element in peer instructional-work-groups. Although peer groups may be homogeneous or disparate in ability, children are always seen as resources for learning and teaching.

In this chapter, the major focus is on peer instructional-work-groups. Because the pedagogical potential of children as resources for one another has not been adequately conceptualized or studied, it is my primary goal to attempt a thorough exploration of what is known about peer work-groups, leaving to others a similar undertaking for teacher-led groups. An analysis of research and theory on teacher-led groups is not part of this chapter. Other authors in this volume examine certain aspects of teacher-led groups (Au & Ignacio; Dreeben; Filby, Barnett, & Bossert; Good & Marshall) and Hallinan and Sorensen (1981) plan to study certain outcomes of teacher-led within-class groups. However, in presenting a typology of instructional groups in classrooms, teacher-led groups are included.

Typology of Face-to-Face Groups

Figure 2 is a typology of face-to-face instructional groups found in elementary classrooms. The first distinction is between teacher-led groups and peer instructional-work-groups. Teacher-led groups usually operate in some type of recitation format and contain a subset of the children in the class. The subset can be ability grouped (the common form of arrangement) or of mixed abilities.[1] Ordinarily the teacher has uniform expectations for each child in the group—the learning task is the same for each group member. Evaluation is also directed at each individual's performance. Peer interaction is not usually expected. Rather, the expected behavior is that a child monitors on-going interactions between the teacher and individual students in the group, and when his or her turn comes he or she responds to the task demands as prescribed by the teacher.

Teacher-led groups may be relatively stable in membership and meet frequently such as reading groups in the first grade. But investigators (Barr & Dreeben, 1980; Hallinan & Sorensen, 1981) are still studying the extent to which membership is stable or shifting in such groups and possible correlates of changing membership. Some teacher-led groups occur on an ad hoc basis when the teacher perceives a common instructional need in a particular lesson. My colleagues and I (Stodolsky, 1981) have observed such teacher-led groups in mathematics classes in the fifth grade. Sometimes children who have missed a lesson or seem to have misunderstood a prior lesson are placed in an ad hoc teacher-led group.

The instructional dynamics of a teacher-led group are difficult to distinguish from whole-class instruction when led by the teacher. Presumably more individual turns are obtained by the members of smaller groups and the task is better matched to the children under the ability-grouped condition. It is expected that student diversity with regard to ability will be more limited than in the whole class. Research on ways in which teachers and students behave in these groups is just appearing (Au & Ignacio, Chapter 12, this volume; Eder & Felmlee, Chapter 11, this volume). Teachers' expectations and pace may vary in different ability-groups within the same classroom, but teachers also differ across classrooms (Barr & Dreeben, 1983).

---

[1] It must be understood that ability grouping may still leave considerable range in performance in a group. The term is relative and inexact both in its use and as actually put into operation in classrooms.

TEACHER-LED GROUPS

Subset of Class-Ability Grouped

- Expectations for performance uniform for each member of group
- Evaluation directed to individuals
- Little or no peer interaction expected
- Teacher controls distribution of child contributions-performances

Subset of Class-Not Ability Grouped

- Expectations for performance usually uniform for each member of group
- Evaluation directed to individuals
- Little or no peer interaction expected
- Teacher controls distribution of child contributions-performances

PEER WORK-GROUPS

Completely Cooperative

- Common end or goal
- Common means and activities
- All members expected to interact-contribute
- Joint product evaluated

Cooperative

- Common end or goal
- Some divided activities or tasks
- All members expected to interact-contribute
- Joint product evaluated

Helping Obligatory

- Individual goals
- Interaction required, helping from any member to any other member
- Each individual evaluated

Helping Permitted

- Individual goals
- Interaction as desired from any member to any member
- Each individual evaluated

Peer Tutoring

- Tutee's goals
- Help in one direction from tutor to tutee
- Tutee work evaluated

Figure 2. A typology of face-to-face instructional groups in classrooms.

Defining Peer Instructional-Work-Groups

Five types of peer instructional work groups are distinguished here. All of these groups are face-to-face settings inhabited by less than the whole class. The five group types are: completely cooperative, cooperative, helping obligatory, helping permitted, and peer tutoring.

In defining these group types I must acknowledge my debt to a variety of researchers and writers who have discussed instructional conditions in group work settings. Useful sources include Sharan and Hertz-Lazarowitz (1980), who identify four levels of cooperation in small-group learning tasks: Slavin (1980), who reviews and analyzes field studies of cooperative learning according to their reward structures; Bar-Tal and Geser (1980), who identify three types of cooperative activities seen in classrooms; Sharan (1980), who reviews experimental approaches to group work; and Cazden (1981), who distinguishes peer teaching, collaborative work, and co-teaching among children. In addition, examining data about learning conditions in elementary schools (e.g. Fisher, Filby, Marliave, Cahen, Dishaw, Moore and Berliner, 1978; Galton, Simon, & Croll, 1980; Gump 1967; Sirotnik, 1981; Stodolsky, 1981) helped to define the range of instructional-group situations.

Let us turn to the peer work-group types. A *completely cooperative* group setting is the first type to be defined. Such groups are characterized by interdependence among children with regard to both means and ends. In a completely cooperative group children work together toward a common end, task, or goal. Members share in all aspects of the group process and activities. All children in the group are expected to interact and/or contribute to the group's activity. Evaluation is directed toward the joint product or outcome of the group effort. Individual children are not evaluated. A discussion, demonstration, or debate is illustrative of completely cooperative group activity.

I term the second type of peer work-group *cooperative*. The distinction between this setting and the completely cooperative one is that some division of tasks and activities may occur. A project in which different children prepare sections would be an example of cooperative activity. Children still share a common end or goal, all are expected to interact and contribute to the group activity, and evaluation is of the group's joint product. Thus the difference between these two types of cooperative group structures is that in the completely cooperative setting children work together all the time, whereas in the cooperative setting children may work separately part of the time. In both settings, coordination and planning are needed for success.

The three remaining types of groups all involve children helping one another. In *helping* groups children have individual goals (which are usually the same) but are in a face-to-face group. Small work-groups may be formed in which children have individual tasks to accomplish but are to assist one another. If the assistance is meant to be mutual one might see instances of what Cazden (1981) has called co-teaching. Mutual assistance or the potential for it is more likely to occur when children of similar ability or achievement levels are grouped together or when the tasks to be accomplished can draw on a variety of skills, talents, and perspectives. In our observations of fifth grades (Stodolsky, 1981), we have observed group settings in which peer interaction for task-related purposes was either permitted or mandated. Grannis (1978) also observed these two conditions in second grades.

I label groups in which children are required to help one another *helping obligatory* groups. Each child is to complete his or her own assignment, and evaluation is on an individual basis. However, children are expected to offer mutual assistance in task accomplishment and help may flow from any member to any other member of the group.

Helping permitted groups occur when children are working on their own individual tasks, are evaluated as individuals, and are allowed but not required to help one another. As in the case of helping obligatory groups, assistance may flow from any group member to any other group member.

Peer tutoring is the last type of setting I define. In *peer tutoring*, children do not share a common goal, nor is each child expected to complete an individual task. Rather, one child (the tutor) is considered more expert than the other(s) and help is to flow in one direction. The asymmetry in the relationship makes it important to distinguish peer tutoring from the other helping groups.

The typology presented here makes a clearer distintion between cooperation and helping than previous writers have done. It also more adequately delineates key features of classroom work-group settings as they actually operate. The typology can be applied to distinguish expected operating conditions and actual practice. An important distinction not usually made is between settings in which children *must* help one another and settings in which such help is permitted but not mandated. The lack of distinction between these two settings has led to some confusion in interpreting studies on the effects of experimental group-work settings.

An example is the research of Webb (1980) and Peterson and Janicki (1979) in which small groups were formed with the expectation of mutual assistance. Children of mixed abilities were placed in groups and outcomes were examined for children of different ability levels in an aptitude–treatment interaction design. Among other findings, these researchers document nonmutual patterns of assistance and participation in mixed-ability groups with children working on identical individual tasks (math problems). Essentially peer tutoring occurs within the mixed-ability groups with the high-ability children assisting those of low ability. The middle-ability children do not benefit from the setting, but neither do they actively participate in a peer or group process in mixed groups. This research highlights the need for identifying different types of work groups. It further shows that the internal working of groups may differ from the intended work-pattern and must be analyzed. In the research cited the expected symmetric relations characteristic of a helping-obligatory group were not enacted. Instead the asymmetric peer tutoring configuration was employed by the children.

Experimental Approaches to Cooperative Learning

Various experimental approaches to cooperative learning have been developed. The actual instructional arrangements involve manipulating reward structures for individuals and groups, sometimes building certain competitive features into the learning situation. The protocols used in the experimental programs have been reviewed elsewhere and are not included here.

Sharan (1980) and Slavin (1980) both provide excellent summaries of the major experimental approaches to cooperative learning. While these approaches are not central to our purpose, such experimental pedagogical activity is contributing to understanding group-work varieties, their implementation, and their effects. Where relevant, findings from these experimental approaches are discussed.

Some Descriptive Studies

Having defined the major types of instructional groups, what is known about their occurrence in today's schools? Although a comprehensive review of descriptive studies is not presented, a suggestive picture can be obtained from a number of recent and fairly large studies, despite the fact that a representative data base is not available.

Data about classroom activities and organization are collected with a variety of methods, which do not all provide similar detail. The work of Gump (1967) and my own work (Stodolsky, 1979; 1983) use an ecological approach, taking the activity segment as the basic unit. Gump (1967) recorded activities in six traditional third-grades for two full days each. He usually found one segment occurring at a time, indicating a lot of whole-class activity. He also found a two-segment activity structure in which some children were doing seatwork on their own while the teacher worked with a small group of children, such as in a reading circle. Eleven percent of student time was spent in teacher-led groups in third grades. Face-to-face peer work-groups were very rare in the classes Gump studied.

Dunkin and Biddle (1974) and Adams and Biddle (1970) found whole-class instruction to predominate at Grades 1, 6, and 11. Smaller interactive groups occurred more often in social studies than in math classes, but were not very common. In our studies (Stodolsky, 1981; Stodolsky, Ferguson and Wimpelberg, 1981) of fifth-grade math and social studies classes we found most math classes worked on the whole-class or two-segment activity pattern. However some math classes had ad hoc small groups formed by the teacher for targeted instruction and others maintained relatively stable subgroups. In some classes we saw the majority of children under teacher direction or supervision and a small group working independently or with mutual assistance. The small group was composed of advanced students or children permitted to use a special math laboratory on a rotating basis. In math classes, about 4% of student time was spent in face-to-face peer work-groups, in either a seatwork or a contest format, and about 5% of student time was spent in teacher-led small-group recitations.

In social-studies classes some teachers made frequent use of working groups that were highly cooperative. Across 19 different fifth-grade classes students spent about 11% of their time in group work activities. No instances of teacher-led small groups occurred in the social-studies classes observed (Stodolsky, in preparation).

Certain subject matter areas provide more peer work-group experience whereas others operate with more teacher-led groups. Sands (1981) found science and home-economics classes contained children working together, often for the purpose of sharing apparatus. Social studies, science, and other laboratory subjects have more frequent use of small peer-groups than such subjects as math, reading, and language arts. Ability grouping and teacher-led groups at the within-class level are more common in reading and language, particularly in the primary grades (Fisher *et al.*, 1978).

Sirotnik (1981) has reported initial data that includes observations in 129 elementary school classes selected to represent varying community types nationally. He reports that fewer than 7% of the students were found in small groups and only 2% of students were actually seen in cooperative groups. Participation of children in such activities as demonstrations, role playing, discussions, and other highly interactive settings appears to be relatively infrequent.

Galton *et al.* (1980) and Galton and Simon (1980) conducted a fascinating study of classes in England in which 8–10-year-olds were enrolled (mostly junior schools). In an effort to document the extent to which recommendations from the Plowden Report (a government report with recommendations for British primary education) had been adopted, they conducted extensive observations. They found that children sat in "base" groups in classrooms but did not frequently participate in actual group-activities. Physical seating arrangements did not reflect curricular practices. Almost 90% of the British teachers studied did not use cooperative groups for teaching academic subjects. Of all activities observed in a year, 10% were cooperative group-work, but of course many children never participated in such groups, as they did not occur in all classrooms.

The British findings are consistent with those from the United States. The actual incidence of cooperative group-work is somewhat higher in Britain but still relatively infrequent in a system in which cooperative group-work has been recommended and with a history of teacher experience and training in such practices. Most children in British and United States elementary schools have little direct experience with peer instructional-work-groups. Many children participate in groups that are teacher led, particularly in the early elementary grades and in reading.

The studies reviewed do not include innovative schools or schools that are deliberately following a particular educational model, as in Project Follow Through or the IGE (Individually Guided Education) approach. Schools that have adopted experimental group-work programs, such as those advanced by Slavin (1980), are also not included. But it would seem that instruction that relies on children working together is not commonplace in our schools and that many children may never have a group experience of this type in their elementary school careers.

The significance of this basic fact must be assimilated both in assessing research efforts to study instructional group processes and in planning such efforts. It would also seem important to understand better why this particular ecology of classrooms is found.

Factors Influencing Peer Work-Group Processes and Outcomes

In this section I apply features of the general conceptual framework and use the typology of peer work-groups to raise some questions for future reseach and interpretation. Thus, factors that influence peer work-group processes and outcomes are identified. Figure 3 contains the elements discussed here.

In the general framework, the importance of task and instructional forms was indicated. Instructional forms constrain the conduct of instruction and produce direct and incidental learning in children. With regard to peer instructional-work-groups, it is important to examine the relations among (*a*) type of group, (*b*) tasks to be accomplished by the group, and (*c*) outcomes. The top row of Figure 3 shows these features.

Are various types of peer work-groups differentially suitable for the accomplishment of certain tasks and activities and for the attainment of certain goals? In

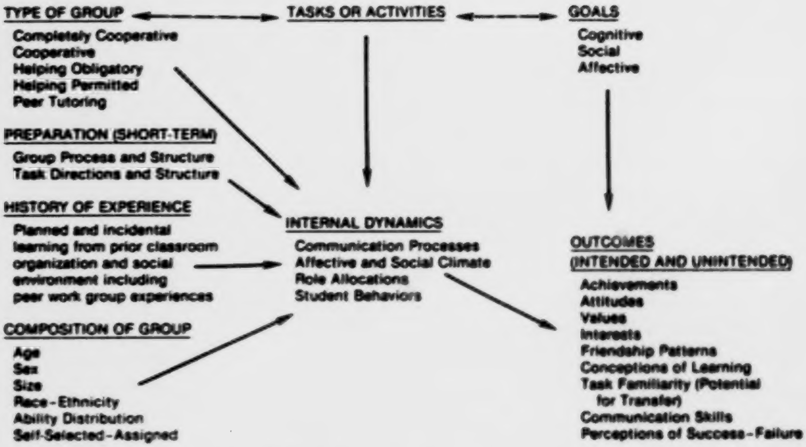
TYPE OF GROUP
Completely Cooperative
Cooperative
Helping Obligatory
Helping Permitted
Peer Tutoring
TASKS OR ACTIVITIES
GOALS
Cognitive
Social
Affective
PREPARATION (SHORT-TERM)
Group Process and Structure
Task Directions and Structure
HISTORY OF EXPERIENCE
Planned and incidental learning from prior classroom organization and social environment including peer work group experiences
INTERNAL DYNAMICS
Communication Processes
Affective and Social Climate
Role Allocations
Student Behaviors
OUTCOMES (INTENDED AND UNINTENDED)
Achievements
Attitudes
Values
Interests
Friendship Patterns
Conceptions of Learning
Task Familiarity (Potential for Transfer)
Communication Skills
Perceptions of Success-Failure
COMPOSITION OF GROUP
Age
Sex
Size
Race-Ethnicity
Ability Distribution
Self-Selected-Assigned

Figure 3. Factors influencing peer work-group processes and outcomes.

practice, what types of activities and tasks are assigned to different peer work-groups? Can one account for outcomes as a result of the tasks given to groups and as a function of actual group processes that occur in varying group structures? Are there optimal configurations of tasks, goals, and group arrangements?

A limited but consistent theoretical and empirical literature suggests that cooperative groups may genuinely facilitate the cognitive development of children and may be more suitable and efficacious for pursuing higher-mental-process goals than helping groups. Several studies showed that members of cooperative groups are sometimes found to produce higher cognitive levels of response than they can as individuals. Skon, Johnson, and Johnson (1981) compared collaborative situations with noncollaborative ones, using both tasks involving categorization and retrieval of nouns and tasks involving setting up equations to solve math problems. Forman (1981) used Piagetian problems involving experiments with chemicals in order to compare children working cooperatively with children working alone. The results of these studies showed that children working together produced problem solutions characterized by higher cognitive levels of response than individual children could produce. The researchers suggest that "the academic discussion within cooperative learning groups promotes the discovery of higher quality reasoning strategies" (Skon *et al.*, 1981, p. 84). Similarly Vygotsky suggests that argument among children spurs children's thought (Cazden, 1981).

Barnes and Todd (1977) studied groups of young adolescents as they solved problems through discussion. Their analysis of tape recordings of problem-solving sessions suggests that the discussion itself facilitates problem solution because it requires multiple contributions. But the data also suggest the importance of task definition and task structure for good discussion.

While cooperative groups seem advantageous for higher mental process goals and for facilitating cognitive development, much small-group research uses helping groups for tasks involving skill learning and problem solving in math and reading. The spontaneous behaviors of children in helping groups where prior knowledge and skill is an important aspect of participation surely contribute to the pattern of outcomes found. Cohen (Chapter 10, this volume) uses expectation-states theory to elucidate patterns of interaction found in such settings.

A child's history of experience with certain curricular practices and values may also affect the way in which the child responds to an experimental program or curricular innovation. Prior experience working in groups is certainly a relevant variable. The tracking policies and other contextual features of a classroom or school might also impact on children's receptivity and ability to work in groups. A study by Amaria, Biran, and Leith (1969) showed that children, particularly boys, from tracked schools performed poorly in mixed-ability cooperative groups but well in uniform-ability groups. Children from untracked schools performed equally well in both types of groups. Evidently the prior experience of the children from tracked schools made working cooperatively with children of mixed abilities difficult. This study illustrates possible history of experience effects that must be examined in conjunction with experimental studies of groups in classrooms.

In general the curricular program to which children are accustomed should be examined when a study of group work is conducted. The *instructional model* in which the grouping takes place must be considered. For example Peterson, Janicki, and Swing (1981) have used a direct instruction model, as have Good and Grouws (1979). Small work-groups embedded in a class accustomed to direct instruction might function differently than those created, for example, in a class that operated on open-education principles or that made extensive use of educational technology for individualization.

Specific preparation of children for group-work settings must also be examined. In many small-group studies little if any preparation of children for the helping, cooperative, or tutorial role is provided. Two aspects of preparation are important: preparation for the specific task and preparation for the social roles and behaviors needed in the group setting.

Cazden (1981) illustrated the utility of adult modeling and rehearsal with children preparing to become peer tutors. She incorporated task mastery for tutors and rehearsal of tutoring behaviors. In studies we have previously reviewed, when tasks are well specified and guidelines provided, even young children seem able to work together rather effectively.

One profitable line of research might be to identify and manipulate methods of assisting children in effective peer exchanges. A possible source for training methods would be some of the experimental programs such as the Jigsaw method (Aronson, 1978), the group investigation approach (Sharan & Hertz-Lazarowitz, 1980), and guidelines for cooperative learning groups (Johnson & Johnson, 1975).

Composition of Groups

In Figure 3 a list of factors relating to group composition is presented. Age, sex, size, race and ethnicity, ability, and whether children are assigned to or select membership in groups are all composition factors that have been researched to some extent and that may be useful in examining existing research on small groups.

Ability is perhaps the most researched composition variable and continues to command active study (Peterson & Janicki, 1979; Webb & Kenderski, Chapter 9, this volume; Peterson *et al.*, Chapter 8, this volume). As is true for a variety of composition variables, the most promising research needs to include systematic data about composition features and to consider carefully the demands and processes embedded in the type of group and tasks being studied.

There is some suggestion that ability composition has its strongest effects in helping groups in which skill learning is the primary goal. Cooperative groups may be less affected by ability composition. Children with leadership skills, a good sense of humor, or other attributes may be important members in cooperative groups. In a tutoring situation, a child with patience might be most successful. In teacher-led groups it is often asserted that docile and compliant children succeed. Thus the type of ability composition in relation to type-of-group needs much more systematic inquiry. This line of analysis may help clarify effects currently found in the literature. It seems clear that combinations of effects relating to composition variables will produce the most interesting questions.

Summary and Conclusion

In this chapter, a conceptual framework thought useful for studying any instructional arrangement was presented (Figure 1). This conceptual view incorporated the idea that instructional forms are both producers of outcomes and outcomes themselves. Some causes and consequences of instructional arrangements were discussed.

The particular focus of the chapter, instructional groups in classrooms, was approached through the presentation of a typology that includes both teacher-led groups and peer work-groups. All groups in the typology are face-to-face groups composed of less than a whole class. Essentially two types of teacher-led groups were identified: ability-grouped and non-ability-grouped. Our main concern was directed toward peer work-groups. Five types were identified and defined: completely cooperative, cooperative, helping obligatory, helping permitted and peer tutoring groups (Figure 2).

Descriptive literature indicated that the use of peer work-groups in today's schools is infrequent. Certain subject areas such as social studies and science seem to use small groups more than others. Peer instructional-work-groups are not now a routine part of every young child's school experience. Teacher-led groups are more common but tend to occur most in the early grades and in reading instruction.

The type of instructional group was seen as related to the nature of the tasks to be accomplished, to the subject matter, and to different outcomes. The interaction patterns and processes that are established in different types of groups may explain some research results. For example, asymmetric interactions would be expected in peer tutoring but may also occur in other helping groups where prior skills and knowledge are important. Cooperative groups in which all members are expected to be active will have more symmetric interactions and may be less affected by group compositional characteristics such as mixing of children with differing abilities. The form of the group and interaction patterns that are promoted also have consequences for outcomes. Evidence suggests that cooperative groups may facilitate higher developmental levels in children than would be accomplished by the same individuals working alone. Conversation, argument, and multiple perspectives that arise in cooperative groups are thought responsible for this result.

A multidisciplinary approach to research on groups in classrooms is clearly necessary. In considering research and its generalizability a number of factors summarized in Figure 3 seem important. In particular, the type of group, the subject matter and goals, the types of outcomes measured and the instructional modality and history in which the studies occur must be the focus of deeper reflection. Individual characteristics of children or composition factors must also be examined. These composition variables include age, sex, race and ethnicity, ability, and whether children are assigned or select their group membership.

The context in which groups are placed (children's learning and curricular history and preparation for group work) were also seen as impacting on the success of a group. Well-defined tasks, suitable to the group form chosen, are more likely to be successfully executed.

References

Adams, R. S., & Biddle, B. J. *Realities of teaching: Exploration with video-tape*. New York: Holt, 1970.

Amaria, R. P., Biran, L. A., & Leith, G. O. M. Individual versus cooperative learning. *Educational Research*, 1969, *11*, 95–103.

Aronson, E. *The jigsaw classroom*. Beverly Hills: Sage, 1978.

Barnes, D., & Todd, F. *Communication and learning in small groups*. London: Routledge & Kegan Paul, 1977.

Barr, R., & Dreeben, R. *A sociological formulation of the way first grade classroom and instructional group organizations affect learning to read.* Paper presented at the Annual Meeting of the American Educational Research Association, Boston, April 1980.

Barr, R., & Dreeben, R. *How schools work*. Chicago: University of Chicago Press, 1983.

Bar-Tal, D., & Geser, D. Observing cooperation in the classroom group. In S. Sharan, P. Hare, C. D. Webb, & R. Hertz-Lazarowitz (Eds.), *Cooperation in education*. Provo, Utah: Brigham Young Press, 1980.

Berger, P. L., & Luckmann, T. *The social construction of reality: A treatise in the sociology of knowledge*. Garden City, New York: Doubleday, 1966.

Blumenfeld, P. C., Hamilton, V. L., Bossert, S. T., Wessels, K., & Meece, J. Teacher talk and student thought: Socialization into the student role. In J. Levine, & M. Wang (Eds.), *Teacher and student perceptions: Implications for learning*. Hillsdale, New Jersey: Erlbaum, 1983.

Bossert, S. T. *Tasks and social relationships in classrooms*. New York: Cambridge University Press, 1979.

Cazden, C. B. *Peer dialogues across the curriculum*. Unpublished manuscript, Harvard University, 1981.

Doyle, W. Paradigms for research on teacher effectiveness. In L. S. Shulman (Ed.), *Review of research in education* (Number 5). Itasca, Illinois: Peacock, 1977.

Dunkin, M. J., & Biddle, B. J. *The study of teaching*. New York: Holt, Rinehart & Winston, 1974.

Fisher, C. W., Filby, N. N., Marliave, R. S., Cahen, L. S., Dishaw, M. M., Moore, J. E., & Berliner, D. C. *Teaching behaviors, academic learning time and student achievement: Beginning teacher evaluation study* (Final Rep. Phase III-B). San Francisco: Far West Laboratory for Education Research and Development, 1978.

Forman, E. A. *The role of collaboration in problem solving in children*. Unpublished doctoral dissertation, Harvard University, 1981.

Galton, M., & Simon, B. *Progress and performance in the primary classroom*. London: Routledge & Kegan Paul, 1980.

Galton, M., Simon, B., & Croll, P. *Inside the primary classroom*. London: Routledge & Kegan Paul, 1980.

Good, T. L., & Grouws, D. The Missouri mathematics effectiveness project: An experimental study in fourth grade classrooms. *Journal of Educational Psychology*, 1979, *71*, 355–362.

Grannis, J. C. Task engagement and the consistency of pedagogical controls: An ecological study of differently structured classroom settings. *Curriculum Inquiry*, 1978, *8*, 3–37.

Gump, P. V. *The classroom behavior setting: Its nature and relation to student behavior* (U.S. Office of Education, Final Report, Project No. 2453). Lawrence: University of Kansas Press, 1967.

Hallinan, M. T., & Sorensen, A. B. *The effects of instructional groupings on growth in academic achievement*. Unpublished manuscript, University of Wisconsin, 1981.

Johnson, D., & Johnson, R. *Learning together and alone*. Englewood Cliffs, New Jersey: Prentice-Hall, 1975.

Luchins, A. S. Mechanization in problem solving: The effect of Einstellung. *Psychological Monographs, 1942, 54*(6, Whole No. 428).

Madaus, G. F., Airasian, P. W., & Kellaghan, T. *School effectiveness: A reassessment of the evidence*. New York: McGraw-Hill, 1980.

Mehan, H. *Learning lessons: Social organization in the classroom*. Cambridge: Harvard University Press, 1979.

Minuchin, P., Biber, B., Shapiro, E., & Zimiles, H. *The psychological impact of school experience: A comparative study of nine-year-old children in contrasting schools*. New York: Basic Books, 1969.

Peterson, P. L., & Janicki, T. C. Individual characteristics and children's learning in large-group and small-group approaches. *Journal of Educational Psychology*, 1979, *71*, 677–687.

Peterson, P. L., Janicki, T. C., & Swing, S. R. Ability × treatment interaction effects on children's learning in large-group and small-group approaches. *American Educational Research Journal*, 1981, *18*, 453–473.

Rosenholtz, S. J., & Wilson, B. The effect of classroom structure on shared perceptions of ability. *American Educational Research Journal*, 1980, *17*, 75–82.

Salomon, G. *The differential investment of mental effort in learning from different sources*. Paper presented at the Annual Meeting of the American Educational Research Association, New York, March 1982.

Sands, M. K. Group work: Time for re-evaluation? *Educational Studies*, 1981, 7(2), 77–86.

Shapiro, E. Educational evaluation: Rethinking the criteria of competence. *School Review*, 1973, *81*(4), 523–550.

Sharan, S. Cooperative learning in small groups: Recent methods and effects on achievement, attitudes and ethnic relations. *Review of Educational Research*, 1980, *50*, 241–271.

Sharan, S., & Hertz-Lazarowitz, R. A group investigation method of cooperative learning in the classroom. In S. Sharan, P. Hare, C. D. Webb, & R. Hertz-Lazarowitz (Eds.), *Cooperation in education*. Provo, Utah: Brigham Young Press, 1980.

Sirotnik, K. A. *What you see is what you get: A summary of observations in over 1000 elementary and secondary classrooms.* Unpublished manuscript, University of California, Los Angeles, 1981.

Skon, L., Johnson, D., & Johnson, R. Cooperative peer interaction versus individual competition and individualistic efforts: Effects on the acquisition of cognitive reasoning strategies. *Journal of Educational Psychology*, 1981, *73*, 83–92.

Slavin, R. E. Cooperative learning. *Review of Educational Research*, 1980, *50*, 315–342.

Stodolsky, S. S. *Ecological features of fifth grade math and social studies classes and their relation to student involvement.* Paper presented at the Annual Meeting of the American Educational Research Association, San Francisco, April, 1979. (ERIC Document Reproduction Service No. ED 184 810)

Stodolsky, S. S. *Subject matter constraints on the ecology of classroom instruction.* Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, April 1981. (ERIC Document Reproduction Service No. PS 012 308)

Stodolsky, S. S. *Classroom ecology in the fifth grade.* Unpublished manuscript, University of Chicago, 1983.

Stodolsky, S. S., Ferguson, T. L., & Wimpelberg, K. The recitation persists, but what does it look like? *Journal of Curriculum Studies*, 1981, *13*(2), 121–130.

Webb, N. M. Process-outcome analysis of learning in group and individual settings. *Educational Psychologist*, 1980, *15*, 69–83.

Wimpelberg, R. K. *A study of parental control in public education.* Unpublished doctoral dissertation, University of Chicago, 1981.

CHAPTER 8

Merging the Process–Product and the Sociolinguistic Paradigms: Research on Small-Group Processes*

PENELOPE L. PETERSON,
LOUISE CHERRY WILKINSON,
FRANCESCA SPINELLI, AND
SUSAN R. SWING

The objective of this chapter is to illustrate how research on small-group processes can be enhanced by an interdisciplinary approach merging two research paradigms: the process–product and the sociolinguistic paradigms. Each paradigm provides a unique focus on small-group processes, such as the behaviors identified as important, the interrelationships of the behaviors, and the outcomes of the group processes. The process–product paradigm has focused on the cognitive aspects of classroom processes that facilitate student achievement (see, for example, Rosenshine, 1979). The sociolinguistic paradigm has focused on the use of language in classroom interaction (see, for example, Wilkinson, 1982). (See Chapter 1 for a discussion of the definition and assumptions of each paradigm.)

In this chapter we outline the rationale for our study on small-group processes and propose the specific research questions. Then we describe the study, including the

---

*This chapter was prepared for a conference on "Student Diversity and the Organization, Processes and Use of Instructional Groups in the Classroom" held at the Wisconsin Center for Education Research, Madison, Wisconsin, May 3–4, 1982. Portions of this chapter were presented as part of a symposium entitled, "Peer Interaction and Learning in the Classroom: Interdisciplinary Perspectives," at the annual meeting of the American Educational Research Association, New York City, March 1982, and at the International Conference for Cooperation in Education, Provo, Utah, July, 1982. The research reported in this paper was funded by the Wisconsin Center for Education Research, which is supported in part by a grant from the National Institute of Education (Grant No. NIE-G-81-0009). The opinions expressed in this paper do not necessarily reflect the position, policy, or endorsement of the National Institute of Education.

THE SOCIAL CONTEXT OF INSTRUCTION
Group Organization and Group Processes

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-552220-7

participants, instrumentation, and procedures. Finally, we discuss the results of the study and show how a merger of the process–product and sociolinguistic paradigms contributes to a greater understanding of the processes that lead to student learning in peer work groups.

Background and Rationale

Relevant Process–Product Research

Process–product researchers typically have not investigated the effects of different patterns of instructional grouping or the processes that occur in small instructional groups in the classroom (Good, 1981). However, recent research on assigning students to small peer-work-groups and allowing them to teach one another suggests that peer work-groups may be particularly effective, at least for some kinds of students (Peterson & Janicki, 1979; Peterson, Janicki, & Swing, 1981; Swing & Peterson, 1982; Webb, 1977). Recently, Webb (1982a) has proposed a process–product model to explain how the processes involved in small-group interaction may be related to achievement. Some of the small-group processes postulated to be related to achievement include giving help, receiving help, and off-task behavior.

Four studies of the process–product type have investigated the relationship between small-group processes and achievement in small peer-work-groups. Peterson and Janicki (1979) and Peterson *et al.* (1981) investigated the relationship between student ability, small-group processes, and achievement with fourth-, fifth-, and sixth-grade students who were assigned to small mixed-ability peer work-groups to work on mathematical seatwork. Both studies found a positive relationship between giving help (*explaining* to another student in the group) and student achievement. High-ability students were engaged more often in giving help than students of other ability levels. Receiving help from another student in a small group (being the recipient of a student explanation) was unrelated to the receiver's ability or to the receiver's subsequent score on the achievement test. Children seemed to improve their own learning by teaching other students, and this teaching benefited the child who was the "teacher" more than the child who was the "student."

Similarly, Webb (1977) found that students who gave explanations of how to complete a task showed higher achievement than students who did not actively engage in group interaction, even when ability level was held constant. These results are strikingly similar to the results of the preceding two studies even though Webb's study was done with eleventh-grade students working in four-person peer work-groups. In contrast to the preceding studies, Webb (1977) found a significant relationship between achievement and receiving help. Webb examined the category of *receiving help* in more detail and found that "when students making errors or asking questions received explanations about the task, they learned how to complete it. When they received either no response from the group or only restated solutions without explanations, they did not learn how to complete the task" (Webb, 1982a, p. 425).

The results of an additional study by Webb (1982b) corroborated her finding that receiving help was effective only when given in response to student need. She found no relationship between the frequency of receiving help and achievement when requests for help were not taken into account. On the other hand, she found that requesting help and receiving it was significantly positively related to achievement whereas requesting help and not receiving it was significantly negatively correlated with achievement.

Relevant Sociolinguistic Research

The second author has proposed a sociolinguistic model of the effective speaker (Wilkinson & Calculator, 1982a), which may prove useful for the analysis of small-group processes because it describes cooperative interaction, for example, requests and responses. The model characterizes the use of requests and responses by school-age children. It has been tested and received support from two sets of data on school-age children (Wilkinson & Calculator, 1982b; Wilkinson, Spinelli, Wilkinson, & Chiang, 1981).

Requests were chosen as the focus of the model for several reasons. First of all, requests are, by definition, social acts; in the course of a request sequence, both speaker and listener say or do something in response to one another. A second reason is that requests can serve two crucial functions for teaching and learning in the classroom: the informational and the interpersonal functions. Requests can be used to obtain information and to regulate interpersonal behavior. A third reason for our choice of focus, is that several investigators have provided evidence that requests are common in teacher-directed activities in the classroom (e.g., Mehan, 1978; Sinclair & Coulthard, 1975). There are fewer data available on the frequency of requests in student-directed activities in the classroom, but several studies suggest that requests are prevalent in instructional contexts involving only students (e.g., Steinberg & Cazden, 1979; Wilkinson & Dollaghan, 1979). Finally, recent linguistic theory provides some guidance regarding the identification and analysis of requests (e.g., Grice, 1967; Labov & Fanshel, 1977).

The model of the effective speaker identifies the following characteristics of requests which predict whether students are successful in obtaining responses from other students. The model predicts that appropriate responses are more readily-obtained for speakers who express requests clearly and directly and who attempt to minimize ambiguity and multiple interpretations of the same utterance. For example, speakers may use *direct forms* and specifically *designate* them to one particular listener when making a request. In the classroom, requests that are *on-task* (that is, those that refer to the shared activities in the teaching–learning situation), and that are perceived as sincere, are most likely to be understood by the listeners, and thus these types of requests are most likely to be successful in obtaining *appropriate responses* from listeners. Effective speakers are flexible in producing their requests: when listeners do not respond appropriately initially, speakers who *revise* their requests are more likely to eventually obtain appropriate responses from listeners.

Previous research by the second author on first- and third-grade children provides support for the model of the effective speaker (Wilkinson & Calculator, 1982b; Wilkinson, Spinelli, Wilkinson, & Chiang, 1981). Data collected on 65 subjects interacting in their peer groups (a combined data base of more than 3600 requests and their responses) showed that children are, on the whole, effective speakers, since they obtained success with their requests for action and information about two-thirds of the time. The typical child usually produced requests that were *direct, sincere, on-task,* and *designated* to a particular listener. In cases when the listener did not comply with the speaker's request, children *revised* their requests two-fifths of the time. The use of language by these school-age children places a premium on explicitness, directness, and assertiveness.

Further analyses of the two data sets provided strong evidence for the predictive nature of the model. A hierarchy of log-linear models was used to fit the data. The model that best fit the data assumed that there were associations among the five characteristics identified (direct, sincere, on-task, designated, revised), whether the request obtained an appropriate response, and whether the request referred to action or information. The major conclusions from the analysis are that the characteristics of requests are correlated, and whether a request obtains an appropriate response depends on all of the other six characteristics identified by the model. The relationship between production of requests and reading achievement was examined. The data showed that students who were effective speakers in producing requests that obtained appropriate responses were also high achievers in reading. Thus, the model of the effective speaker may be useful in predicting responsiveness in peer-group interaction, and there may also be beneficial consequences for the achievement of individual students in the group.

Statement of the Research Questions

The preceding discussion presents a brief summary of relevant research from the process-product and sociolinguistic paradigms. Using a combined approach, we investigated the following two research questions:

1. What are the processes that occur in small groups that are significantly related to achievement (e.g., providing and receiving explanations, requests for information)?
2. How might these processes mediate achievement?

These questions as stated allow for an exhaustive and generative investigation of classroom interaction processes and of how they relate to achievement. Although we are interested in conducting such an examination, at present it is our intent to use our data simply to illustrate the combined use of the two paradigms. More specifically, in the sociolinguistic analysis we address two research questions, one at the individual level of analysis and one at the group level: (*a*) Is there a pattern of students' use of requests that is associated with high achievement of the individual student? (*b*) Does use of this pattern of requests have an effect on the achievement of other group members? In the process–product analyses, we are interested in whether providing and receiving explanations are related to student achievement. Other aspects of small-group interaction are discussed when so doing enhances understanding of the interrelationship of the process, product, and sociolinguistic variables. Our intention is to illustrate the benefits of a fruitful merger of the paradigms for conceptual, methodological, analytical, and interpretive aspects of research on small-group processes. Additional reports of the findings, including further analyses of these variables and other independent and process variables, will be available in subsequent reports.

Method

Subjects

Forty-three male and female students from two combined second–third grade classes in an elementary school in Wisconsin participated in the study. Four of the students were members of ethnic minority groups; the others were Caucasian, and all were native English speakers. Students participated as members of their intact math classes and were taught by their regular teachers. Both teachers were experienced female teachers who had volunteered to participate in the study. The teachers received honorariums for their participation in the study.

Instrumentation

At the beginning of the study, students completed the following aptitude measures: the Mathematics Concepts Level C/Form 1 subtest of the SRA Achievement Test (Science Research Associates, 1978); and the Mathematics Computation Level C/Form 1 subtest of the SRA Achievement Test (Science Research Associates, 1978). The Mathematics Concepts subtest and the Mathematics Computation subtest were group-administered to the children on two separate days of pretesting. Items were read aloud, and students responded on a standard answer sheet. The Mathematics Concepts subtest consisted of items 1 through 35 from the SRA test and 5 additional items on time and money that were developed for this study. The Mathematics Computation subtest consisted of items 1 through 27 from the SRA test plus 4 additional items on computations with money developed for this study.

The Peabody Picture Vocabulary Test (Dunn & Dunn, 1981) was individually administered to each child. The experimenter first established the basal level for the child at the point where the child answered 8 items in a row correctly. The experimenter continued to present items until the child missed 6 of 8 items. The raw score equaled the last item administered minus incorrect items. Standard, stanine, and percentile scores were computed.

At the completion of the 10-day unit on money and time, student achievement was assessed using a 38-item achievement test constructed by the experimenters that was designed to measure comprehension and application of the major concepts taught in the unit. This test was composed of problems taken from the daily seatwork and included an approximately equal number of problems from each seatwork lesson. Each student's raw score on the achievement test was computed as well as the percent of problems that were correct of the total attempted by the student.

On the day after students completed the achievement test, they were given a sociometric questionnaire. The questionnaire was adapted from the Pupil Evaluation Inventory developed by Pekarrik, Prinz, Liebert, Weintraub, and Neale (1976). The inventory consisted of three subscales: affiliation, competence, and leadership. Each student received a workbook with the names of the children in his or her small group on each page. The question on each page was then read aloud by the experimenter, and the student responded to the question by putting an X on the child's name to answer each question. For example, "Who gets the most answers right in your math group?" The student responded to this question by placing an X on the name in his or her work group who got the most answers right. This item was designed to assess competence. The maximum numbers for the competence and leadership subscales were 4 and 4 respectively, whereas the maximum for the affiliation scale was 3 because children were not allowed to select themselves on affiliation items.

High-quality video and audio recordings of the small-group interaction were collected. Each of the 11 math groups was videotaped three times, including a focus on the group during the review and development portions of the lesson when the teacher was teaching and the seatwork portion of the lesson when students were working in small groups. Groups were seated at small tables within the classrooms that also contained the other groups of students. Background noise and general environmental characteristics appeared to be comparable among the groups.

The segments of the small-group interaction itself, from the time that the teacher gave the signal that seatwork was to commence until the completion of the activity, approximately 20 to 30 minutes, was fully transcribed according to conventions established and described in published work (Wilkinson & Calculator, 1982a, 1982b). Complete and accurate transcriptions of the language used by each of the students in the videotaped group was transcribed in conventional orthography. Subsequent analysis and coding focused on discrete categories of language behavior, that were initially identified, and subsequently coded along multiple dimensions, including requests. A *request* was coded when a student asked for information from another student or the teacher. The request could occur as *wh* questions, yes–no questions, a tag question, a statement issued as a question by the use of rising pitch, a declarative statement issued with the intention of eliciting information, an imperative, or a nonlexical request for information in which vocal or gestural displays indicated a request for information. We coded *responses* as appropriate or not appropriate. The following categories were coded for requests: *direct, sincere, on-task, designated,* and *revised.*

In addition, the videotapes were coded using an adaptation of the observation instrument developed by Peterson and Janicki (1979). Coders viewed the videotapes and checked the categories of behavior engaged in by the four students in the small group during consecutive 20-second intervals. While coding the videotaped interaction, coders had the written transcript in front of them to help them follow the dialogue.

Categories of student behavior and small-group interaction that were coded included the following: *listening, working, waiting, explaining to another student, receiving a student explanation, requesting academic information, requesting procedural information, answer checking, social interaction, off-task, finished, waiting for help,* and *interim.* In addition, five subcategories of explanations were coded to determine whether the explanation merely provided the receiver with an answer or whether the explainer elaborated the explanation. First, the student might have simply provided an answer to a question. Second, a student may have provided a nonelaborated response which consisted of the explainer providing a simple but appropriate response to a content-related question. Third, a student might have provided a higher-order explanation which included a conceptual elaboration or a reason for acting in a particular way or the sequencing of two or more steps in a problem. Procedural–academic was the fourth category where the explainer informed another student or the group of the general procedures or instructions that were to be followed in completing the mathematical seatwork tasks or asked the student a question with the intent of directing group functioning. A fifth category of managerial–nonacademic was coded. Similarly, subcategories of receiving student explanations were created to correspond to the categories of the explanations that were coded.

Procedure

Before the study began, one of the experimenters met with the teachers to discuss the teaching approach and the curriculum. The teaching approach described was a small-group approach similar to that used by Peterson and Janicki (1979) and Peterson *et al.* (1981). According to this approach, the teacher divides the lesson into approximately three segments: review, development, and seatwork. Teacher presentation of the lesson, including review and development, takes approximately 25 to 30 minutes. The teacher then assigns students to work on seatwork problems in small groups. During seatwork, children write answers in their own workbooks but are told to consult with other students in their group if they need help in arriving at the answers. Students are told to get help from others in the group before asking the teacher for assistance. The teacher monitors students' work to provide help if needed and to make sure that students are working and helping one another. The teacher lets the students know that their work will be checked at the end of the period.

The curriculum unit consisted of a unit on money and time developed by the experimenters. The first seven lessons dealt with money and the last three lessons dealt with time. The teachers taught from detailed lesson plans developed by the experimenters to ensure that the same content was covered in the same way.

Before the study began, students were assigned to a small mixed-ability group of four students. Students' scores on the Mathematics Concepts pretest were used to assign students to groups. Within each class students were stratified on their Mathematics Concepts scores into high (upper quartile), medium (second and third quartiles), and low ability (bottom quartile). Stratified random assignment was then carried out within each class so that each small group consisted of one high-ability student, two medium-ability students, and one low-ability student. Within class 1 there were four groups of four students each and one group of three students. Within class 2 there were six groups of four students each.

During the study, each teacher taught the unit for approximately 50 minutes per day. Both classes were taught at the same time during the day. Each day after the lesson two groups from each class were interviewed using a stimulated-recall procedure. (See, for example, Peterson, Swing, Braverman, & Buss, 1982.) Students were shown videotaped segments of the day's small-group interaction and were asked to reflect on their own cognitive and communicative processes. After 10 days of instruction, the students completed the achievement test.

Statistical Analyses

In analyzing the data from the present study, we employed a technique typical of process–product research. We correlated the frequency scores on categories of student behavior with the students' achievement scores as measured by the achievement test given at the end of the unit. Partial correlations were computed to control for class (class 1 vs. class 2) and for students' initial mathematical ability which was defined as the sum of the students' z scores on the Mathematics Concepts subtest and the Mathematics Computation subtest. Partial correlations were computed with the student and the small group as the unit of analysis.

Sociolinguistic Analyses

Both quantitative and qualitative analyses were conducted to examine the relationship between students' achievement and students' use of requests in the small groups. We addressed two specific research questions: (*a*) Is there a pattern of students' use of requests associated with high achievers? (*b*) Do some students (e.g., high achievers) using this pattern have an effect on the achievement of all group members?

Quantitative Analyses

We focus first on the relationship between achievement and the direct and appropriate response characteristics of requests, because prior work has established the saliency of these characteristics (Wilkinson, 1983). Data collected on these 43 subjects interacting in their groups, a combined data base of approximately 1500 requests and their responses, showed that the children were, on the whole, effective speakers, since they obtained *appropriate responses* to their requests for action and information about 50% of the time. Students produced requests that were *direct, sincere, on-task,* and *designated* to particular listeners. In cases when the listener did not comply with the speaker's request, students *revised* their requests 15% of the time. The analysis showed that the characteristics of requests were positively correlated, and whether a request obtained an appropriate response depended on all of the other six characteristics identified by the model. In particular, requests that took a direct form were consistently more likely to obtain appropriate responses. The variables of on-task, designated, and sincere requests were not expected to and did not show positive relationships with achievement, for the purely statistical reasons of lack of variability and ceiling effects. The data base for revisions was too small for analysis. Thus, we focus on the direct and response aspects of requests.

THE RELATIONSHIP BETWEEN REQUESTS AND ACHIEVEMENT, SOCIAL STATUS, AND LANGUAGE KNOWLEDGE

We address two research questions, the first at the level of individual analysis for all students. Table 1 presents partial correlations, controlling for class and ability, between categories of requests and student achievement. A significant positive relationship was found between direct requests and both total and proportional achievement scores, as can be seen in Table 1. This suggests that the use of direct forms was a crucial element in students' knowledge about obtaining appropriate responses to requests. Further analyses examined the basis of the positive relationship between achievement and the direct requests that obtained appropriate responses. The data showed that these positive correlations were strongly influenced by requests for action. The most important requests for action were those that obtained appropriate responses and conformed to the model of the effective speaker—requests that were direct, on-task, designated, sincere. The correlation between these requests and both measures of achievement were also positive and statistically significant.

There was also a positive relationship between the production of these types of requests and the sociometric variables, $r = .33$, $p \leq .05$. The correlation between these requests and the competence sociometric scale was $r = .38$, $p \leq .05$. These data

TABLE 1

Partial Correlations (Controlling for Class and Ability) of Students' Achievement Scores with Students' Scores on Categories of Requests and Responses[a]

	All Students ($N = 42$)	
Categories of Student Behavior	Total Achievement	Proportion Correct
Direct requests	.40**	.38**
Obtaining appropriate responses	.28*	.15
Procedural requests for action	.33*	.27*
Requests for action that obtained appropriate responses	.34*	.29*

[a] Two types of achievement scores were computed. The total achievement score was the total number of items that the student answered correctly. The proportion correct was the proportion of items answered correctly of the total attempted by the student.

*$p < .05$ using one-tailed test of significance.

**$p < .01$ using one-tailed test of significance.

suggest that the other students perceived students who produced these types of requests as competent and high in terms of sociometric standing. There was a positive relationship between production of these requests and language vocabulary ability, $r = .31$, $p \leq .05$.

Further analyses showed that procedural requests were by far the most frequent (68 of 141; 48%), and the correlation between procedural requests for action and both total and proportional achievement was consistent with the overall pattern identified for all students combined in the analysis. The evidence supports the position that there is an identifiable pattern of using requests for high-achieving students.

These data suggest that *higher ability* students produced requests that were concerned with the *pacing*, time-management of the group, and with monitoring and guiding behavior, and that they were high achievers. Examples of these types of requests are given in Table 2. We know that the students often did not finish their seatwork lessons, so that the more work a student completed, the higher the achievement for that student. Pacing and effective use of time on task thus became crucial elements in this study.

Students who directed regulative requests toward other students were *high achievers*. The content of the requests indicates that these students may have been motivating themselves and others to do the task, to guide the task, and to monitor their own and others on-task behavior. These students looked like "task masters," consistently pacing the other students to manage time efficiently to keep on track to get the task done. The data suggest that high-achieving students were involved highly in self-monitoring and motivating to keep on-task, so that the production of these requests serves as an index of "private speech."

The second research question concerns the effect that the use of requests may have

TABLE 2

Examples of Direct, Sincere, On-Task Procedural Requests

Requests for Action	Requests for Information
Go back and check.	Anybody finished?
Okay, let's get back to work everybody.	Everybody have four done here?
'Kay now: let's get to our other page.	You finished the page already?
Let's go on to number two.	You startin' from the bottom?
Bill, turn to the rocket page.	Do you wanna compare ours together?
Now, help Sue. Now help her out.	Can we start?
Quit it! I'm tryin' to work.	'Kay, you guys wanna check?
Speak louder.	Are you goin' down this way?
Hold on, Bonnie. We have to check.	Where are ya?
Okay, go to the very beginning. Jean's first, I'm second, Pat's third and (points to other child to go last).	Do we have to correct these?

on other members of the group and on the group process itself. Partial correlations, controlling for class and mathematical ability, were computed between the production of these requests and overall *group* achievement. The results provide a mixed pattern of evidence, which may be partially accounted for by the low N in the analysis. The correlations do not unambiguously support the interpretation of the positive effect of these requests upon others. Correlations between procedural and achievement scores of the group that conformed to the model of the effective speaker were related to total achievement scores ($r = .53$, $p < .10$) but not to proportional achievement scores ($r = .35$, $p > .10$). Thus, there is evidence that suggests that "task masters' " use of requests may affect other group members' achievement. These mixed findings are intriguing and suggest further analysis. Task masters may provide the mechanism for the achievement of other group members as well as for themselves through the use of procedural requests directed to others.

Qualitative Analyses

We discuss one group, Group A, which demonstrated a relatively high mean on initial mathematical ability (ranked third among the 11 groups) and a high level of direct, on-task, successful procedural requests (ranked second among the groups).

We have also chosen a particular student in this group, Carl, to illustrate this pattern. Carl's use of these requests is high, and the requests seem to indicate high self-motivation to do the task and high monitoring and guidance of his own task behavior. Carl is high in initial mathematical-ability and was also the highest-achieving student in his group. Carl demonstrates elements of a task master. His initial mathematical-ability score is high, and his sociometric score reveals that he is perceived by other group members as capable of performing this role. The following episode exemplifies Carl's use of sincere, on-task procedural requests. Sincere on-task procedural requests for action (RA) and information (RI) are indicated.

1. (RI) Carl: Okay, whadda we got to do now?
2. Jim: I'm on the third one.
3. (RI) Carl: (to Jim) You startin' from the bottom?
4. Jim: (to Carl) No.
5. (RA) Carl: First person to finish this stop after that.
6. Jim: I'm on the last one.
7. Carl: So'm I.
8. Sue: I'm not.
9. Sue: I'm not stopping until I'm finished.
10. Carl: I finished th- this page already.
11. (RA) Mort: Wait. I don't get this.
12. Carl: I'm on this page. This is gonna be simple.
13. (RA) Carl: You're just about finished. When you're finished, stop everybody. (points at Sue)
14. Sue: A'right.
    (Children work independently for a short while.)
15. (RA) Sue: Stop.
16. (RA) Carl: Okay, stop.
17. (RI) Jim: Why? (in a somewhat hostile tone)
18. Carl: 'Cuz sh-
19. Sue: 'Cuz I'm finished.
20. Carl: Yeah 'n she, she is the last one. Ready? OK.
21. Sue: A'right. The first one is three eighty-five.

In this segment, Carl uses requests to establish a pacing rule (5) and to reiterate that rule (13) as the group nears completion of the indicated worksheet. Carl's task orientation is also evidenced by his failure to "rise to the bait" when Jim challenges his authority (17). Carl responds to this challenge by providing the requested information in a neutral intonation pattern and then immediately indicates his desire to continue with the task. Carl reinforces his verbal messages with effective nonverbal communication. For example, when answering Jim's challenge, he points to Sue's completed sheet and then makes an encompassing gesture to the group as a whole. The latter is combined with his verbal attention-getting phrase of "Ready? OK." He is successful in getting the group to comply with his requests to stop working on further problems and to begin checking.

In contrast to the effective use of procedural requests in Group A, examination of the interactions occurring in other groups revealed less frequent and more ineffective use of these pacing requests. Coordination of the group checking-task required students to keep working until all group members had completed a certain number of problems; however, the children were encouraged to continue with further problems if others had not finished the set to be checked. While all groups demonstrated some difficulty in negotiating when to stop, members of other groups often did not persist in coordinating their efforts. Rather, they tended to become involved in arguments. This pattern is illustrated in the following segment from Group B, which ranked low in initial mathematical ability and low on achievement. Group B's use of procedural requests was also very low (.04, ranking tenth of eleven).

(Direct, on-task, procedural requests are indicated.)

1. (RA) Leah: (to Chuck and Steve) Come on. (because they are looking at her answers)
2. Chuck: (to Edie) We have to check.
3. Chuck: That's twelve thirty. Got that right.
4. (RA) Chuck: (looking at Leah's paper, whispering) Come on.
5. Steve: Leah's the one that's always keepin' us. Leah's the one that's keepin' us all from doing our work.
6. Chuck: Yeah.
7. Steve: Whenever it was Sheila we would (unintelligible)
8. Edie: With Sheila?
9. Steve: Yeah. At least she's better than Leah.
10. Edie: (to Steve) Just (gives him disgusted look)
11. Steve: I mean it.
12. Leah: I only, I only gotta do two more times, these, two more things.
13. Steve: (to Leah) Oh shut up.
14. Steve: See we're all on the next page.

Chuck attempts to initiate checking (2), but not all group members are finished. No one in the group suggests they continue their individual work. Rather, Chuck and Steve comment on Leah's speed in an apparent attempt to pressure her (4, 5).

Summary of Sociolinguistic Analyses

The pattern of data suggests that production of these direct on-task, procedural requests by some students serves as an index of both initial mathematical ability and subsequent achievement levels, as well as social standing in the group. Students who produced these types of requests were high achievers and were perceived as competent and high in social status within their groups. This relationship may be either an indexical or a causal one or both. These students produced requests that conform to the model of the effective speaker. They knew the content and procedures of the task, and they knew the group processes—how to get things done in order to keep moving along. They were "rule-followers," who were highly respected by the other group members. The data show that their own actions were beneficial for themselves and may have benefited other group members by maintaining on-task behavior.

There may be a beneficial effect on other students' achievement as a result of some students directing their requests to other students. The production of requests themselves is an index of high achievement and may be a cause for the effect of high achievement by others. This possible causal relationship is particularly important, because the students know "how to learn" within a group and cooperate with each other, so that the pacing and monitoring behaviors produced by the effective-speaker–high-achiever student in their own group are beneficial.

The sociolinguistic analyses employed in this study were theoretically motivated, with categories derived from the model of the effective speaker's use of requests to obtain appropriate responses from others. The quantitative analyses resulted in the discovery of the importance of a *pacing* variable, the use of requests that serve to guide and monitor the students' own behavior. In the qualitative analyses, by descriptions of the groups' processes, we have examined the relationships between pacing and achievement. Now we turn to the process–product analyses, which provide further information about how group processes and achievement are related, including corroboration and disconfirmation of some of the findings identified by sociolinguistic analyses.

Process–Product Analyses

As described previously, we computed partial correlations, controlling for class and mathematical ability between students' scores on the observation variables and their achievement scores. Although we used two achievement scores—total achievement scores and proportion correct of the total items attempted—we focus primarily on the latter achievement score in our subsequent discussion. We found that students' total achievement scores were attenuated because the achievement test included problems from the seatwork assignments, some of which students had not been able to complete due to time constraints. Thus, the more accurate measure of students' learning seemed to be the proportion of items correct of the total items attempted.

Partial Correlations of Giving Explanations and Receiving Explanations with Students' Achievement Scores

We were particularly interested in whether the categories of giving student explanations and receiving student explanations were significantly related to student achievement. These categories are similar to the categories of giving and receiving help described by Webb (1982a). In this study, giving an explanation was coded whenever a student (*a*) explained to another student in the small group, (*b*) clarified something already said or done, (*c*) suggested what to do, (*d*) provided an idea, (*e*) gave information, (*f*) solved a problem out loud, or (*g*) gave a solution to a problem.

In the first two columns of Table 3 are shown the partial correlations between students' achievement scores and scores on the categories of providing explanations, answer checking, off-task, and working. In support of previous studies that have found a positive relationship between giving explanations and student achievement (Webb, 1982a), we found that providing academic explanations—a composite category that included providing an answer, a nonelaborative explanation, a higher-order explanation, or a procedural explanation—was positively related to students' achievement scores, as measured by proportion correct of total attempted ($r = .21$, $p < .10$). Results for only one of the four individual explaining categories were consistent with those found for the composite category: providing procedural explanations was positively related to student achievement. The other three categories were unrelated to student achievement (defined as proportion correct). A fifth category, providing managerial explanations about nonacademic content, was also unrelated to student achievement.

The first two columns of Table 3 also present the partial correlations for three additional categories of student behavior: answer checking during seatwork, off-task behavior during seatwork, and working on seatwork. The correlations for the proportional achievement scores show that off-task behavior was negatively related to achievement and that a certain kind of on-task behavior, answer checking, was positively related to student achievement. Working on seatwork problems was unrelated to achievement. Students were encouraged to check their answers to seatwork problems as a group and then to help members of their group who did not have the correct answer. Apparently, students who engaged in this answer-checking procedure with group members tended to do better on the final achievement test than students who did not engage in answer checking.

Table 4 shows the partial correlations between receiving explanations, requesting information, and students' achievement scores (see the first two columns of Table 4). Requesting procedural information and requesting academic information were unrelated to student achievement as measured by proportion correct of total attempted. Receiving an academic explanation, the previously defined composite category, was negatively related to students' achievement scores, ($r = -.49$, $p < .01$ for total achievement; $r = -.29$, $p < .05$ for proportion correct). However, a clearer picture emerged when individual explaining-categories were examined. Receiving a nonelaborative explanation and receiving a higher-order explanation were unrelated to student achievement. Receiving an answer and receiving a procedural academic explanation were significantly negatively related to achievement.

The results for receiving an answer partially support a statement by Webb (1983). Webb argued that the previous findings that no relationship exists between receiving help and achievement (Peterson & Janicki, 1979; Peterson *et al.*, 1981) can be explained by distinguishing between the kind of help received: explanations or "terminal responses" (defined as indicating that an answer was incorrect without giving the correct answer or giving the correct answer without explaining how to get it.) Webb reported that studies that have made this distinction have found a significant *negative* relationship between receiving "terminal responses" and student achievement and a significant *pos-*

TABLE 3

Partial Correlations (Controlling for Class and Ability) across and within Ability-Levels of Students' Achievement Scores with Students' Scores on Behavior Categories[a]

	All Students (N = 43)		High-Ability Students (N = 11)		Medium-Ability Students (N = 21)		Low-Ability Students (N = 11)	
Categories of Student Behavior	Total Achievement	Proportion Correct	Total Achievement	Proportion Correct	Total Achievement	Proportion Correct	Total Achievement	Proportion Correct
Giving an answer	−.06	.18	.55*	.61**	−.19	.00	−.16	.14
Giving a nonelaborative explanation	−.21*	−.10	.34	.29	−.04	.22	−.56*	−.38
Giving a higher-order explanation	.11	.07	.01	−.02	.23	.13	.26	.22
Giving a procedural academic explanation	.07	.21*	.28	.30	.01	.37*	−.37	−.18
Giving a managerial nonacademic explanation	.12	.08	.44	.46*	−.14	−.18	−.27	−.40
Answer checking	.02	.22*	.69**	.71**	.09	.18	−.24	.13
Off-task during seatwork	−.10	−.26**	−.47*	−.43	.02	.09	−.57**	−.78***
Working on seatwork	.10	.14	−.45	−.44	.16	.34*	.79***	.65***

[a] Two types of achievement scores were computed. The total achievement score was the total number of items that the student answered correctly. The proportion correct was the proportion of items answered correctly of the total attempted by the student.

*$p < .10$ using one-tailed test of significance.

**$p < .05$ using one-tailed test of significance.

***$p < .01$ using one-tailed test of significance.

TABLE 4

Partial Correlations (Controlling for Class and Ability) across and within Ability-Levels of Students' Achievement Scores with Students' Scores on Categories of Receiving Explanations and Requesting Information[a]

Categories of Student Behavior	All Students ($N = 43$)		High-Ability Students ($N = 11$)		Medium-Ability Students ($N = 21$)		Low-Ability Students ($N = 11$)	
	Total Achievement	Proportion Correct	Total Achievement	Proportion Correct	Total Achievement	Proportion Correct	Total Achievement	Proportion Correct
Receiving an answer	−.50***	−.43***	.22	.15	−.36*	−.04	−.91***	−.91***
Receiving a nonelaborative explanation	−.08	.01	.06	.04	−.27	−.24	−.18	.09
Receiving a higher-order explanation	−.13	.14	−.26	−.30	.03	.12	−.26	.16
Receiving a procedural academic explanation	−.35***	−.26**	.23	.22	−.08	.11	−.84***	−.76***
Receiving a managerial nonacademic explanation	−.09	−.16	.47*	.50*	−.02	−.11	−.34	−.53*
Requesting procedural information	−.01	.13	.44	.47*	.06	.14	−.04	.14
Requesting academic information	−.21*	−.09	−.07	−.09	−.24	−.11	−.19	−.11

[a] Two types of achievement scores were computed. The total achievement score was the total number of items that the student answered correctly. The proportion correct was the proportion of items answered correctly of the total attempted by the student.

*$p < .10$ using one-tailed test of significance.

**$p < .05$ using one-tailed test of significance.

***$p < .01$ using one-tailed test of significance.

itive relationship between receiving explanations and student achievement. Webb offered the following rationale for these findings:

> Merely being supplied with the correct answer to a problem, or being told that one's answer was incorrect would not be expected to help the learner discover the correct procedures for solving the problem. Furthermore, receiving terminal responses may frustrate the learner, causing him or her to lose interest in the task, and, consequently, the material . . . Receiving explanations, on the other hand, would be expected to help the learner correct misunderstandings and learn the correct procedures. (Webb, 1983, pp. 38–39).

The results of the present study partially support Webb's findings because receiving answers was significantly *negatively* related to students' achievement scores. Possible reasons for this finding are elaborated in a subsequent section. However, in the present study receiving a higher-order explanation was *unrelated* to students' achievement scores.

Why was receiving a higher-order explanation not significantly related to student achievement? One possibility is that in the present study the age and cognitive development of these children was such that they were unable to give either accurate or effective higher-order explanations to other students. Previous studies by Peterson that have found a significant relationship between receiving a higher-order explanation and achievement have employed upper elementary students (see, for example, Peterson, 1981), whereas studies by Webb that have found such a relationship have employed junior high or high school students (Webb, 1983). Obviously, upper elementary, junior high, and high school students are more sophisticated, both socially and cognitively, than the second- and third-grade students who participated in the present study. Perhaps a certain level of cognitive development and social skills are necessary to be able to provide effective higher-order explanations to others, and perhaps the students in the present study did not have the necessary skills.

Indeed, the following example suggests that this might be the case. In this example, Allen is explaining a problem to Sheila. On the student's worksheet it shows several books and the cost of each book. The problem on the worksheet is, "You have $2.15. How much more money do you need to buy the two books, *101 Stories* and *Turtles?*" (*101 Stories* costs $2.32; *Turtles* costs $1.05.)

Allen: Well, is *takeaway* or *plus* the next one?
Sheila: (reading) How much more than . . .
Allen: Then how come you're sittin' here um puttin' three seventy-seven it might be—it might be um takeaway.
Allen: See here: (reads) how much *more* money do you need to buy *101 Stories* and *Turtles.*
Allen: Write two fifteen right here.
Sheila: (shakes head "no")
Allen: Huh-huh. (looks at Sheila's paper) You dope. Two thirty-two? It's not two thirty-two; it's one *thirty-seven.* It's *plus.* That's *plus.*
Sheila: What's?

Allen: (pointing on Sheila's paper) That's plus. You didn't write the answer. 'N that's not the answer.
Sheila: I know. To—this one is—I added *Turtles* and *One*—you have to add those two together first.
Allen: I know. But those add together. (looks back on own paper) I put takeaway. I put plus. It's three thirty-seven.
Sheila: Three thirty-seven I *put* that.
Allen: And then you *takeaway* three two—three two one.

The preceding is an example of a higher-order explanation. Unfortunately, the higher-order explanation is not successful and by the end of the explanation the recipient of the explanation, Sheila, appears to be more confused and frustrated than she was at the beginning. Even though the explanation contains all of the informational components needed to work the problem correctly, Allen does not organize the components into an easily understandable sequence of steps. Sheila may not benefit from the explanation because she is unable to organize the explanation so that it makes sense. If this is a typical case, then it is easy to understand why receiving higher-order explanations was not significantly positively related to student achievement.

Within-Ability-Level Partial Correlations of Giving Explanations and Receiving Explanations with Students' Achievement Scores

The results of previous studies by Peterson and colleagues have shown that the effects on achievement of task-related small-group interaction, including giving explanations, receiving explanations, and answer checking, depend on the ability level of the student. (See for example, Peterson, 1981). For example, Swing and Peterson (1982) found that high ability students who provided higher-order explanations to other students in their group tended to do better on achievement tests than high-ability students who did not provide such explanations. Similarly, for low-ability students, task-related interaction (defined as providing and receiving higher-order explanations, asking questions, and answer checking) was significantly positively related to performance on achievement and retention tests. In contrast, for medium-ability students, task-related interaction, including giving and receiving explanations, was unrelated to students' performance on achievement and retention tests.

To explore the possibility of such within-ability-level effects in the present study, we computed within-ability-level partial correlations (controlling for class and math ability) of students' scores on categories of task-related small-group interaction with students' achievement scores. Ability level (high, medium, or low) was defined by the initial stratification procedure within the class. Table 3 presents the correlations within ability-level for categories of giving explanations, answer checking, off-task behavior, and working on seatwork. Table 4 presents the correlations within ability-level for the categories of receiving explanations and requesting information.

Taken together, the correlations in Tables 3 and 4 indicate that several categories of task-related small-group interaction were *positively* related to the achievement of high-ability students. These include giving an answer, giving a managerial nonacademic explanation, answer checking, requesting procedural information, and receiving a managerial nonacademic explanation. On the other hand, for medium-ability students, task-related interaction was, for the most part, unrelated to students' performance on the achievement test. Thus, the present findings for high-ability students and medium-ability students support our previous findings (see, Peterson, 1981; Swing & Peterson, 1982). In contrast, for low-ability students several categories of task-related small-group interaction tended to be *negatively* related to student achievement. These included receiving an answer, receiving a procedural academic explanation, and receiving a managerial nonacademic explanation. On the other hand, working on seatwork problems was significantly positively related to the achievement of low-ability students, whereas off-task behavior was significantly negatively related to their achievement. These findings suggest that low-ability students who worked on their seatwork, were not drawn off-task, and did *not* participate in small-group interaction, actually did better than low-ability students who participated in small-group interaction, did not work as diligently on their seatwork, and tended to be off-task. We further explore these findings by analyzing the high-ability student and the low-ability student, respectively.

THE HIGH-ABILITY STUDENT

One way of interpreting the present findings is to say that although high-ability students benefited from task-related interaction in the small group, the other students in the group, particularly the low-ability students, did not benefit from the interaction. For example, high-ability students who engaged in answer checking with group members or provided answers to other members of their group did better on the achievement test than high-ability students who did not engage in these behaviors. One possible explanation for this finding is that in checking answers or in giving an answer to another student, a high-ability student may come to discover that her or his answer is incorrect and then work through the procedure to obtain the correct answer. Thus, the high-ability student learns by providing answers or checking answers with other students in the group. An example is the following interaction in which Johnny, the high-ability student in the group, learns during the course of answer checking that his answer is incorrect:

Katie: (reading the answer from her paper) Dollar sign zero point forty-four.
Johnny: What? Whaddya mean "zero point forty-four"?
Katie: (pointing on Johnny's paper) Zero point forty-four.
Johnny: What? Eight nickels and four pennies equals thirty-six.
Katie: Eight nickels.
Johnny: Eight nickels. Eight times four equals thirty-two. Thirty-two plus four equals thirty-six.
Anne: No, it's forty-four, Johnny.

Katie: Let's go on with it.
Johnny: Which one are we on?
Anne: We're on five.
Katie: Five.
Johnny: (to Anne) Whaddya mean forty-four?
Anne: It's the eight nickels—forty-four.
Johnny: Ah, yeah. Wait a minute. Wait a minute.
Anne: It's forty-five.
Johnny: No, wait, it's not even thirty or forty-four. Naw, God, it's forty-nine.
Katie: Yeah.
Johnny: Forty-nine. No, wait a minute, it's forty-eight?
Anne: It's forty-four.
Johnny: It's forty-eight. Eight times . . .
Katie: Okay. (counting on fingers) 5, 10, 15, 20, 25, 30, 35, 40, 41, 42, 43, 44.
Johnny: No, wait, wait a minute. Okay, Okay, eight . . .
Anne: (counts on fingers to show Johnny) 5, 10, 15, 20, 25, 30, 35, 40, 1, 2 3, 4.
Johnny: 5, 10, 15, 20, 25, 30, 35, 40. Okay, 40 + 4 = 44.
Anne: Ha-ha-ha-ha-ha.
Johnny: Ha-ha-ha-ha-ha.

In addition to the possibility that high-ability students may have increased their own learning by providing answers to other students in the group and checking their answers with others in the group, there is also the possibility of a positive motivational effect of providing answers to others in the group. For example, researchers on tutoring have often reported that children who serve as tutors show an increase in self-esteem and more positive attitudes toward school as a result of providing information to other children. (See, for example, Allen, 1976.) In the present study, during the stimulated-recall interview following the lesson, one high-ability student, Allen, was asked whether or not he learned as a result of providing an explanation to another student (the low-ability student) in his group. Allen replied, "It helped me learn. I didn't, I didn't think that, um, I was that smart and, it helped me learn that I was, I was that smart." In other words, perhaps the high-ability student felt good as a result of being the one who provided information to other students in the group. This positive feeling about his or her own ability may have led to increased learning on the part of high-ability students.

THE LOW-ABILITY STUDENT

In contrast to high-ability students, the results suggest that the achievement of low-ability students was not facilitated by the small-group interaction. For high-ability students, giving answers to others in the group was positively associated with achievement. However, the receiver of these answers would have been the medium-ability students or the low-ability student in the group. For low-ability students, receiving answers was significantly *negatively* related to achievement. In other words, those low-ability students who received answers from others in the group tended to do more poorly on their achievement tests than did the students who did not receive such answers. One obvious hypothesis is that low-ability students were being given the answers by others in the group, and they wrote down the answers without having a clear understanding of how to work the problems themselves. The following is a good illustration of one case in which this occurred. In this group, Allen is the high-ability student, Karen and Sheila are the medium-ability students, and Greg is the low-ability student. Students are engaging in answer checking in this example. Allen, the high-ability student, gives the first answer.

Allen: One point zero five.
Karen: Fifty-four I put.
Greg: (to Allen) One point zero five?
Allen: (to Greg) Yes.
Karen: I put fifty-four.
Greg: I put eighty-one.
Allen: (to Sheila) What'd you put?
Karen: (to Allen) I put fifty-four.
Allen: Oh.
Greg: (to Allen) Okay, what'd ya have?
Allen: The next one is dollar sign . . .
Greg: Hold it. I'm confused, um, dollar . . . (Greg is writing)
Sheila: (pointing on Greg's paper) No, not that.
Allen: (to Greg, leaning over his paper) It's not . . . It's five. It's 0 [zero] five. (Greg is erasing his answer).
Allen: It's a dollar 0 five (to Greg, who is still writing) 0 five.
Allen: Alright. The next one is, dollar sign zero point seventy-one.
Greg: It's a dollar sign zero point (to Allen) *eight* one!
Allen: Seven one!
Karen: Seven one (erases on her paper).
Greg: (while erasing) seven one.
Karen: One (finishes correcting her answer).
Greg: Well, at least I got the *one* right.
Allen: (Erasing on Karen's paper) It's not a *dollar* either.

In the previous example, one gets the impression that the other students in the group, particularly the low-ability student, Greg, are not learning by receiving the answers from the high-ability student, Allen. The answer-checking process involved in this example contrasts strikingly with that portrayed in the example involving the high-ability student, Johnny. Greg passively changes his answers when they disagree with the answers of other members of his group. However, Johnny insists that his answer is correct until he is convinced otherwise by a demonstration of the correct problem-solving procedure. Thus, receiving the answers from Allen, in fact, may be detrimental to Greg's learning because, unlike Johnny, Greg does not demand an explanation of the problem, nor is he forced to work out the problem for himself or to determine why his answer is incorrect.

In addition to the significant negative relationship between receiving answers and the achievement of low-ability students, a significant negative relationship appeared between receiving procedural explanations and achievement of low-ability students (see Table 4). A possible explanation is that procedural explanations tended to be given to a student when she or he was having trouble with a seatwork problem or when she or he was off-task. This latter argument is supported by the finding that, for low-ability students, receiving procedural explanations was significantly positively related to off-task behavior ($r = .54, p < .05$). Thus, receiving procedural explanations may serve as an index of either lack of understanding of the math problems or lack of attention to the learning task or both. This is illustrated in the following example from Group B, a group that was discussed previously in the sociolinguistic analysis.

1. Edie: (to Leah) You have to do this other page stuff.
2. Leah: (to Edie) But I don't know how to.
3. Edie: (to Leah) I'm sorry.
4. Chuck: (to Leah and Edie) I'll help you later. But I ain't tellin' you the answers. I'm just tellin' ya to count that money.
5. Chuck: (to Steve) Alright, you're peekin' at my stuff. (Chuck giggles.)
6. Leah: (to Chuck) You write sloppy. (Leah and Chuck giggle for several seconds and exchange whispered remarks.)

Edie's procedural explanation (1) was directed to Leah presumably because Leah had not completed one of the pages of assigned seatwork problems. Upon receiving the procedural explanation, Leah indicates that she does not understand the problems (2). Thus, here, receiving the procedural explanation does serve as an index of lack of understanding. The lack of understanding (and lack of immediate help from other students) leads eventually to off-task behavior by the receiver of the procedural explanation, Leah (6).

The three variables that were strongly negatively related to achievement for low-ability students were all highly intercorrelated. We have already indicated the positive relationship between receiving procedural explanations and off-task behavior of low-ability students. Receiving answers was also significantly positively related to off-task behavior of low-ability students ($r = .77, p < .01$) as well as to receiving procedural explanations by low-ability students ($r = .73, p < .01$). Because these three variables are highly interrelated, it is impossible to determine which variable is most important. However, they do suggest that certain aspects of the small-group interaction (e.g., receiving answers) may have had negative effects on the achievement of low-ability students. This finding is further buttressed by the fact that the only student behavior that was found to be significantly positively related to the achievement of low-ability students—working on seatwork—tended to be coded when the student was working alone and was not engaged in small-group interaction. Thus, in this study it appears that low-ability students learned more if they worked alone and did not receive "help" in the form of answers or procedural explanations from their peers in the small group.

Comparison of the Results of the Process–Product and the Sociolinguistic Analyses

The within-ability-level correlations for providing and receiving procedural and managerial explanations provide an interesting counterpoint to the findings from the sociolinguistic analysis. One implication of the sociolinguistic findings is that procedural requests directed toward others in the group may serve to motivate, guide, and monitor others' behavior. The process–product results fail to support such an interpretation. For high-ability students, requesting procedural information was significantly *positively* related to their achievement. In addition, high-ability students who gave procedural or managerial explanations to others in the group tended to do better on the achievement tests than high-ability students who did not give such explanations. On the other hand, there was no indication that receiving such procedural or managerial explanations from higher-ability students benefited either the medium-ability or the low-ability students in the group. In fact, for low-ability students, receiving a procedural explanation was significantly *negatively* related to their achievement. Thus, not only did procedural explanations *not* serve to motivate, guide, or enhance low-ability students' behavior and achievement, but there is a possibility that such procedural explanations actually *debilitated* low-ability students' learning. One is left with the alternative explanation that high-ability students were involved in self-monitoring to keep themselves on-task and that the production of procedural requests, managerial explanations, and procedural explanations serves as an index of the private speech of these students, and is associated with high achievement by these students. Thus, for the high-ability student, giving procedural and managerial explanations might serve a metacognitive function of keeping the student on track regarding what procedures he or she should follow to complete the learning task.

An additional finding that puts the sociolinguistic analysis in perspective is that the sociolinguistic procedural request variables were significantly related to several of the process–product measures of small-group interaction. For example, 8 out of 10 "direct, sincere, on-task procedural requests for action" shown in Table 2 would have been coded as "providing procedural explanation" in the process–product analysis. Procedural requests for action were significantly related (across all students) to answer checking ($r = .33$, $p < .05$), off-task behavior ($r = -.35$, $p < .05$), giving procedural explanations ($r = .28$, $p < .05$), and receiving higher-order explanations (r

= .32, $p < .05$). Requests that obtained appropriate responses were significantly related to off-task behavior ($r = -.33$, $p < .05$), giving a higher-order explanation ($r = .28$), giving a procedural explanation ($r = .25$, $p < .05$), and the composite category of giving academic explanations ($r = .40$, $p < .05$). Thus, an alternative explanation to the argument provided in the sociolinguistic analysis is that procedural requests are related to achievement through their association with giving academic explanations, answer checking, and on-task behavior, which are, in turn, facilitative of student achievement. In any case, because the sociolinguistic procedural request variables and several of the process–product variables are highly related, it is impossible to determine which of these small-group interaction variables are most important in affecting student achievement.

However, taken together the results of the process–product and sociolinguistic analyses do seem to converge on one explanation—that for some students, assuming the role of task master by providing managerial explanations, making procedural requests, providing answers, and engaging in answer checking, has a positive motivational effect. Thus, perhaps by assuming this role a student gains confidence and is positively motivated to learn, and his or her learning is enhanced as a result.

In addition, the results point to the need for training students to work together in small groups and to engage in small-group interaction that facilitates the achievement of all students in the group. Although other researchers have noted the existence of developmental differences in the skills needed to participate effectively in peer work-groups (see, for example, Cooper, Marquis, King, & Moore, 1982), the results of the process–product analyses suggest that students as young as 7 and 8 years old may not have the cognitive and social skills that are necessary to work and learn effectively in small groups. The results of the sociolinguistic analyses suggest that although these students were generally effective speakers, they obtained appropriate responses to their requests only 50% of the time, and they revised their requests only 15% of the time. Thus, there is room for improving these students' communication skills. Training could be directed toward teaching cognitive, communication, and social skills to students with the intent of enhancing small-group learning.

To date, few researchers have attempted to train students in small-group interaction skills and to evaluate the effects of training on small-group interaction, learning in small groups, and student achievement. However, the results of one study by Swing and Peterson (1982) do suggest that training in small-group interaction skills can enhance small-group learning and the achievement of low- as well as high-ability students. Fifth-grade students received training in two 50-minute sessions and two short review sessions. The first session involved discussion and demonstration of principles of interpersonal relations, good-teaching behaviors, and general behavioral guidelines for interacting in small groups. The second training session focused on improving the explaining skills of students. Students then participated in 4 weeks of classroom instruction and small-group learning similar to the present study. Results indicated that trained students participated in more task-related interaction in their peer work-groups than did control students who had received no training. Moreover, task-related interaction in the small groups enhanced the achievement and retention of high- and low-ability students.

In sum, the study by Swing and Peterson (1982) serves as a model for research on training in small-group interaction skills. Furthermore, the results of the present sociolinguistic analyses suggest the possible importance of training selected communication skills in addition to the cognitive and social skills that were taught in the Swing and Peterson (1982) study.

Conclusions and Implications

The sociolinguistic analyses showed that certain qualities of requests, for example, directness and remaining on-task, were positively related to the probability of obtaining an appropriate response and to the subsequent achievement of the requestor. These findings have implications for process–product researchers. They suggest that the pragmatic characteristics of the speech act may mediate the effectiveness of an academic interaction, independent of the content of the exchange. Thus, it may be necessary for process–product researchers to control for the effects of speech characteristics in order to get a better idea of the relationship between requests and receipt of information and achievement.

From the standpoint of the process–product research reported in this chapter, it would be of particular interest to extend the analysis of pragmatic qualities to include an analysis of explanations. It is conceivable that the higher-order explanations offered by the third-graders in this study showed only a small positive relationship to the achievement of the recipients because the pragmatic characteristics rather than the content of the explanations made them difficult to comprehend and apply. The example in which Allen is explaining to Sheila lends credence to this suggestion. Allen's explanation did not exhibit certain qualities, for example, organization and clearly specified referents, that intuitively would seem to enhance effective communication. Possibly, this accounts for Sheila's observable comprehension difficulties.

On the other hand, sociolinguistic researchers may also be informed by considering variables from process–product research. The sociolinguistic analyses failed to show a relationship between the requests for *academic* information that followed the model of the effective speaker and the obtained appropriate responses and achievement. There was an overall positive relationship between requests that obtained appropriate responses and achievement, however. This effect was primarily accounted for by procedural, in contrast to academic requests. Findings from process–product research offer suggestions for this result. Research from this paradigm has found that the usefulness of the academic information depends on the type of information obtained. For example, obtaining answers and other terminal responses is sometimes related to poorer achievement, whereas obtaining information about general or specific task-procedures is sometimes positively correlated with achievement. Thus, it may be useful for sociolinguistic researchers to consider the academic content of a communication when it is desirable to investigate the relationship between requests for information that obtain appropriate academic responses.

Acknowledgments

We thank Chi-Pang Chiang, Janet Lindow, Linda Milosky, Kevin Stark, and Greg Waas for their assistance with data collection and analysis; Joel Levin and Ron Serlin for their statistical advice; and Crescent Kringle and Cindy Dunne for typing this manuscript. We also thank the teachers in this study, Sue Bohlman and Lois Narges; the principal, Joanne Yatvin; and the students for their cooperation in this research. The first two authors contributed equally to this chapter.

References

Allen, V. L. Children helping children: Psychological processes in tutoring. In J. R. Levin & V. L. Allen (Eds.), *Cognitive learning in children: Theories and strategies.* New York: Academic Press, 1976.

Cooper, C. R., Marquis, A., King, J., & Moore, M. S. *Emerging developmental issues in the structure and process of peer learning in the classroom.* Paper presented at the Annual Meeting of the American Educational Research Association, New York City, March 1982.

Dunn, L., & Dunn, L. *The Peabody picture vocabulary test.* Circle Pines, Minnesota: American Guidance Corp, 1981.

Good, T. L. *Research on teaching* (Tech. Rep. No. 207). Columbia, Missouri: Center for Research in Social Behavior, University of Missouri, 1981.

Grice, P. *Logic and communication.* Unpublished William James lecture, Harvard University, 1967.

Labov, W., & Fanshel, D. *Therapeutic discourse.* New York: Academic Press, 1977.

Mehan, A. Structuring school structure. *Harvard Educational Review,* 1978, *48*(1), 32–64.

Pekarrik, E., Prinz, R., Liebert, P., Weintraub, S., & Neale, J. The sociometric test adapted from the pupil evaluation inventory: A sociometric technique for assessing children's social behavior. *Journal of Abnormal Psychology,* 1976, *4*(1), 83–97.

Peterson, P., & Janicki, T. Individual characteristics and children's learning in large-group and small-group approaches. *Journal of Educational Psychology,* 1979, *71,* 677–687.

Peterson, P., Janicki, T., & Swing, S. Ability x treatment interaction effects on children's learning in large-group and small-group approaches. *American Educational Research Journal,* 1981, *18*(4), 453–473.

Peterson, P. L. *Ability x treatment interaction effects in studies of small-group learning.* Paper presented at the Annual Meeting of the American Educational Research Association, Los Angeles, April 1981.

Peterson, P. L., Swing, S. R., Braverman, M. T., & Buss, R. Students' aptitudes and their reports of cognitive processes during direct instruction. *Journal of Educational Psychology,* 1982, 74(4), 535–547.

Rosenshine, B. Content, time and direct instruction. In P. L. Peterson & H. J. Walberg (Eds.), *Research on teaching: Concepts, findings, and implications,* Berkeley, California: McCutchan, 1979.

Science Research Associates. *SRA achievement series level C/form 1.* Chicago: Science Research Associates, 1978.

Sinclair, J., & Coulthard, R. *Towards an analysis of discourse: The English used by teachers and pupils.* London: Oxford University Press, 1975.

Steinberg, Z., & Cazden, C. Children as teachers—of peers and ourselves. *Theory into Practice,* 1979, 4 (18), 258–266.

Swing, S. R., & Peterson, P. L. The relationship of student ability and small-group interaction to student achievement. *American Educational Research Journal*, 1982, *19*(2), 259–274.

Webb, N. M. *Learning in individual and small-group settings* (Tech. Rep. No. 7). Stanford, California: Aptitude Research Project, School of Education, Stanford University, 1977.

Webb, N. M. Student interaction and learning in small groups. *Review of Educational Research*, 1982, *52*(3), 121–145. (a)

Webb, N. M. Group composition, group interaction, and achievement in cooperative small groups. *Journal of Educational Psychology*, 1982, 74(4), 475–484. (b)

Webb, N. M. Predicting learning from student interaction: Defining the interaction variables. *Educational Psychologist*, 1983, *18*, 34–42.

Wilkinson, L. Cherry. *Communicating in the classroom*. New York: Academic Press, 1982.

Wilkinson, L. Cherry. Using requests effectively in peer-directed groups. Unpublished manuscript, 1983.

Wilkinson, L. Cherry, & Calculator, S. Effective speakers: Students' use of language to request and obtain information and action in the classroom. In L. Cherry Wilkinson (Ed.), *Communicating in the classroom*. New York: Academic Press, 1982. (a)

Wilkinson, L. Cherry, & Calculator, S. Requests and responses in peer-directed reading ability groups. *American Educational Research Journal*, 1982, *19* (1), 107–120. (b)

Wilkinson, L. Cherry, & Dollaghan, C. Peer interaction: Interpersonal management and exchange of information in first-grade reading groups. *Theory into Practice*, 1979, *18*(4), 267–274.

Wilkinson, L. Cherry, Spinelli, F., Wilkinson, A. Cherry, & Chiang, C. *Peer communication in third grade reading groups* (Tech. Rep. No. 583). Madison, Wisconsin: Wisconsin Center for Education Research, 1981.

CHAPTER 9

Student Interaction and Learning in Small-Group and Whole-Class Settings*

NOREEN M. WEBB AND
CATHY MOORE KENDERSKI

Introduction

Although the past decade has seen a proliferation of studies investigating learning in small groups in the classroom (see, for example, reviews by Johnson, 1981; Sharan, 1980; Slavin, 1980a, 1980b), only in the last few years have researchers started to explore the mechanisms through which student-directed small groups affect learning. A small body of research has focused on the varieties of student interaction that influence learning within small groups and the characteristics of individuals and small groups that predict student interaction. A few of these studies suggest that specific interaction variables and sequences of interaction must be examined to obtain meaningful information on the relationship between student interaction and learning. The purposes of the present study are to attempt to replicate recent findings relating student interaction and learning and to clarify the relationships among student and group characteristics, student interaction, and learning in small-group and whole-class settings.

Three categories of student interaction were expected to relate to achievement: giving explanations, receiving explanations, and receiving no explanations in response to questions or errors. The results of previous studies present a fairly consistent picture of the impacts of giving explanations and receiving no explanations on achievement. In contrast, the research on the relationship between receiving explanations and achieve-

---

*Paper prepared for the Conference on Student Diversity and the Organization, Processes and Use of Instructional Groups in the Classroom, University of Wisconsin at Madison, May 1982.

The research reported here was supported in part by grants from the National Institute of Education (NIE-G-80-0068), the Spencer Foundation (seed grant through the University of California), and the Academic Senate Committee on Research, Los Angeles Division, University of California.

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-352220-7

ment is inconsistent. Nearly all of the studies examining giving explanations have found a positive relationship between that interaction variable and achievement (Peterson, & Janicki, 1979; Peterson, Janicki, & Swing, 1981; Webb, 1980a, 1980b, 1980c, 1982b), whereas only one study failed to find a significant relationship between giving help and achievement (Webb, 1982a). The definition of giving help in the latter study, however, included any information given to another student, not only explanations. The results of a recent synthesis of the studies on group interaction suggest that giving information other than explanations is not beneficial for learning, with the implication that giving help in general may not relate to achievement (Webb, 1983; for a slightly different result, see Peterson *et al.*, Chapter 8, in this volume). The present study, then, distinguishes between giving explanations and giving other kinds of help.

The few studies examining the effect of *not* receiving explanations when needed are also fairly consistent, suggesting that this experience is detrimental for learning (Webb, 1980b, 1982a, 1982b; Webb & Cullian, in press). The most recent of these studies also showed that receiving a terminal response to a question or error (for example, stating the correct answer without any explanation, indicating which page the problem was on, pointing out that another student made an error without explaining how to solve the problem) was nearly as detrimental for learning as receiving no response at all. In an attempt to replicate this finding, the present study distinguishes between receiving explanations, terminal responses, and no responses to questions and errors.

In contrast to the results for giving explanations and not receiving explanations when needed, the results for receiving explanations are mixed. Peterson and colleagues found no significant relationship between receiving explanations and achievement (Peterson & Janicki, 1979; Peterson *et al.*, 1981), whereas other studies reported a positive relationship (Webb, 1980a, 1980b, 1980c, 1982a, 1982b). The present study attempts to replicate the latter finding and to clarify the reasons for the inconsistent results.

One group and four individual characteristics were used to predict student interaction and achievement in the present study: group ability composition, individual ability, relative ability within the group, extroversion–introversion, and intellectual achievement responsibility. Three group ability compositions have been investigated in previous research—uniform ability; mixed ability with high-ability, medium-ability, and low-ability students; and mixed ability with high-ability and medium–ability students *or* medium-ability and low-ability students—but the present study is the first to investigate all three simultaneously. Comparisons of uniform-ability groups and mixed-ability groups with highs, mediums, and lows have consistently found no difference between group compositions for all students combined but have shown medium-ability students to be at a disadvantage in mixed-ability groups, where they were often left out of interaction between highs and lows (Webb, 1980a, 1980b, 1982b; see also Peterson *et al.*, 1981, for a similar result in a comparison between mixed-ability small groups and large groups). The study comparing uniform-ability groups and mixed-ability groups with highs and mediums *or* mediums and lows found that mixed-ability groups were beneficial for all students (Webb, 1982a). Students' questions were answered more often in the latter group composition than in the former. Based on the results for the three group compositions it was expected that for all students combined uniform-ability groups and high–medium–low mixed-ability groups would be equally effective for learning but less effective than high–medium and medium–low mixed-ability groups. Medium-ability students, on the other hand, were expected to perform best in high–medium and medium–low groups and worst in high–medium–low groups.

Of the individual characteristics examined here, student ability has been investigated most often. Nearly every study examining ability as a predictor of student interaction has found a positive relationship between ability and giving explanations (Peterson & Janicki, 1979; Peterson *et al.*, 1981; Webb 1980a, 1980b, 1980c, 1982b). The same relationship, therefore, was hypothesized here. Since the relationships between ability and other student interaction variables in previous studies were inconsistent, no hypotheses were formed here.

Relative ability within the group was used as a proxy for status to investigate Cohen's hypothesis that perceived competence affects the frequency of student interaction and, hence, learning (see Cohen's Chapter 10 in this volume). With the variety of group compositions examined in this study, it was hypothesized that relative ability within the group would be more powerful than absolute ability in predicting interaction. Medium-ability students in medium–low groups, for example, had relatively high ability within the group and would be expected to play a different role from that of medium-ability students in high–medium groups who had relatively low ability within the group.

Although only two studies have related extroversion–introversion to interaction in the group, both yielded the same result: extroverted students were more likely than introverted students to receive answers to their questions (Webb, 1982a, 1982b). The same result was expected here.

Although intellectual achievement responsibility has rarely been investigated as a predictor of student interaction and achievement in small groups, the definition of the construct and data from whole-class settings suggest a prediction in the present study. The intellectual achievement responsibility scale was designed to assess "children's beliefs that they, rather than other people, are responsible for their intellectual–academic successes and failures" (Crandall, Katkovsky, & Crandall, 1965, p. 91). Crandall and her colleagues reported positive correlations between intellectual achievement responsibility and standardized achievement test scores and school grades at the elementary and secondary school levels, although several nonsignificant correlations did appear occasionally (Crandall *et al.*, 1965; Crandall, Katkovsky, & Preston, 1962). Although the use of the intellectual achievement responsibility scale was exploratory in the present study, it was expected that the direction of the relationships with achievement and student interaction would be positive.

Because few studies have compared achievement *and* interaction in small-group and whole-class settings, the comparison in the present study was largely exploratory. The two previous studies comparing the instructional approaches found no differences in achievement and found similar interaction experiences across settings (Peterson & Janicki, 1979; Peterson *et al.*, 1981). The major purpose of examining the whole-class setting in the present study was to determine whether interaction patterns seen in small groups appear in the whole-class setting and whether they have the same impact on learning as they do in small groups.

The present study investigated the relationships among group and individual characteristics, student interaction and achievement in small group and whole-class settings in junior high school mathematics classes. Student interaction in all classes was tape-recorded to obtain detailed and unambiguous records of students' questions, explanations, and errors.

Method

Subjects

One hundred and seven students from three average-ability Los Angeles junior high school mathematics classrooms participated in this study. Sixty-nine students in two classrooms worked in small groups, and 38 students in one classroom learned the same material with conventional whole-class instruction. All classes had students from Grades 7 and 8. Approximately 51% of the students were female and 54% were minority students (Black, Mexican-American, Asian-American). All three classes were taught by the same teacher. Because the mathematics classes at this school are tracked by ability rather than by grade, each class had students from Grades 7 and 8.

To determine whether the classes assigned to the small-group condition were comparable to the class assigned to the conventional instruction condition, the conditions were compared on available student characteristics. The results of the analyses showed that the classes in the two conditions were comparable on all measured characteristics: equal ratio of girls to boys ($\chi^2(1) = .86, p < .36$), equal ratio of white minority students ($\chi^2(1) = 1.09, p < .30$), equal mean ability ($t(105) = .20, p < .84$), equal mean extroversion–introversion ($t(105) = .62, p < .54$), and equal intellectual achievement responsibility (positive scale: $t(105) = .18, p < .86$; negative scale: $t(105) = .21, p < .83$).

Instruments and Materials

ABILITY TEST

The 90-item mathematics ability test consisted of two sections: a 50-item subtest on arithmetic skills and a 40-item subtest on mathematical reasoning. The test, developed by teachers at the school to determine assignment of students to classes, was administered to all students at the beginning of the school year. Internal consistency alpha for the total test was .78, for the skills section was .72, and for the reasoning section was .71. Scores for the total test in this sample ranged from 25 to 74 ($M = 55.1$ and $SD = 7.6$). The score on the total test was used as the ability measure in this study because it correlated more highly with achievement than either subtest for all students combined ($r = .27$ for the total test, $r = .21$ for the reasoning subtest, $r = .21$ for the skills subtest).

PERSONALITY MEASURES

At the beginning of the study, two personality measures were administered. Students completed the extroversion–introversion scale of the Eysenck Personality Inventory (Eysenck & Eysenck, 1968). A high score (out of a total of 24 items) indicates extroversion. Students also completed the Intellectual Achievement and Responsibility Scale (Crandall *et al.* 1965). This scale measures the degree to which students feel that they, rather than others, are accountable for their academic performance. In addition to the total responsibility score on this scale, two subscores can be obtained. A positive scale score indicates one's belief in internal responsibility for success and a negative scale score indicates one's belief in internal responsibility for failure. For the sample the two subscales correlated .25 ($p < .05$).

ACHIEVEMENT TEST

The achievement test was a 24-item teacher-made test consisting of items similar in content and form to those completed by students in class work. Internal consistency alpha for the achievement test was .72.

INTERACTION VARIABLES

Student interaction was coded separately for the classes working in small groups and the class receiving whole-class instruction. Student interaction in small groups was recorded on an audio recorder. Information about interaction among students and the identity of the speaker came from transcriptions of the tapes. The frequency of occurrence of each of 16 interaction variables was tallied.

The interaction variables and estimated generalizability coefficients (see Cronbach, Gleser, Nanda, & Rajaratnam, 1972) for two coders are (*a*) makes an error and receives an explanation (.89), (*b*) asks for and receives an explanation (.80), (*c*) receives a response to a procedural question (.96), (*d*) makes an error and is not corrected (.98), (*e*) makes an error and receives only the correct answer without an explanation (.89), (*f*) asks for an explanation and receives no response (.97), (*g*) asks for an explanation and receives only the answer (.89), (*h*) asks a procedural question and receives no response (.86), (*i*) gives an explanation (.96), (*j*) answers a procedural question (.87), (*k*) corrects an error (.86), (*l*) gives the correct answer to a problem (.99), and (*m*) performs calculations (.97). The average of two coders' ratings was used in all analyses.

It is important to note that the frequencies for initiating and receiving utterances did not always match. For example, within a group the number of explanations given was sometimes different from the number of explanations received (e.g., when several students gave an explanation to one student the frequency of giving explanations was higher than that of receiving explanations).

Information about student interaction in the whole-class setting came from transcripts of audio recordings and from detailed notes recorded by observers. The seven interaction variables and estimated generalizability coefficients for two coders are (*a*) receives help from the teacher (.93), (*b*) receives help from a student (.91), (*c*) gives help to another student (.91), (*d*) works with another student (.96), (*e*) gives the correct answer to exercise (.80), (*f*) gives an incorrect answer to an exercise (.94), and (*g*) asks a question and receives no response (.99).

INSTRUCTIONAL MATERIALS

The topic of the 3-week instructional unit was perimeter and area of geometric figures. Students worked on teacher-made worksheets and exercises in their textbook.

Procedure

ASSIGNMENT OF STUDENTS TO GROUPS

Students' scores on the ability test were used to assign students to groups. Three ability-strata were defined (high, medium, and low) corresponding to the top 25%, middle 50%, and bottom 25% of the sample, respectively. There were three kinds of groups: (1) mixed-ability groups with high-, medium-, and low-ability students ($N = 33$) (2) mixed-ability groups with high- and medium-ability students *or* medium- and low-ability students ($N = 11$), and (3) uniform-ability groups with all medium-ability students ($N = 25$). Students within the medium-ability stratum were randomly assigned to the three kinds of groups; students within the high-ability and low-ability strata were randomly assigned to the two mixed-ability group compositions. These three group-compositions represent comparisons investigated in previous studies (see Webb, 1980a, 1980b, 1982a, 1982b; Webb and Cullian, in press). Because the ability scores of several students were not available when they were assigned to groups, information provided by the teacher was used to estimate those student's ability levels. The ability scores, when made available, differed from the estimated ability-scores for several students in the second type of mixed-ability group, which made it necessary to reclassify their groups from the second type of mixed-ability group to the first type. The reclassification produced a relatively large sample-size in the first type of mixed-ability group, and a small sample size in the second type of mixed-ability group.

To ensure that the three group-compositions were comparable on all measured characteristics, background characteristics of the students were analyzed. The results of these analyses showed that the group compositions were comparable: there was an equal ratio of boys to girls in all three types of groups ($\chi^2(2) = 0.77, p < .67$) and an equal ratio of white to minority students ($\chi^2(2) = 2.99, p < .22$). The three types of groups had nearly identical means on ability ($F\ (2,65) = 1.96, p < .15$), extroversion–introversion $F(2,65) = 1.62, p < .21$), and intellectual achievement responsibility (positive scale: $F(2,65) = 0.31, p < .73$; negative scale: $F(2,65) = 0.21, p < .81$). Most groups had four students; some had three. All groups had female and male students and had white and minority students.

Classroom Activities

SMALL GROUPS

This study was conducted during a year-long program on cooperative group learning at the school. At the beginning of the school year, students in the two classes learning in cooperative small groups were assigned to groups and given time to practice working together. Instructions specific to group work were given to the students by the teacher. Students were told to work together, to help those who had difficulty, and to ask each other for help when needed. Students were told not to divide the work among themselves. They were told to solicit the teacher's help only after all group members had been questioned regarding a problem. The teacher began each class period with a brief lecture on the material. Then, students worked in small groups for the rest of the period. The teacher monitored the group work by answering questions and providing hints when groups could not continue. The classes had been working in small groups for approximately 2 months when the study began.

During the study, every group was tape recorded for at least 15 minutes. The groups were tape recorded in a random order. Microphones were clipped to each group member's shirt and connected to one channel of a hand-held stereo tape recorder. Under headphones the observer spoke identification numbers into a microphone connected to the other channel of the recorder. Distraction of group members during recording was minimal because with the use of extension cords, the observer could stand 8–10 feet away from the group. Transition from group to group usually took less than 1 minute and generally went unnoticed by group members.

WHOLE-CLASS INSTRUCTION

Each class period began with a 10- to 15-minute explanation and question–answer period led by the teacher. Students were encouraged to ask questions and to respond to other student's inquiries. After this introduction, students were told to work independently on the activities assigned for the day. They were instructed to raise their hands when they needed help. The teacher walked around the room, helping students when they had a problem.

A random sample of five class periods was tape recorded and observed. The observer sat in the back of the classroom and wrote descriptions of classroom activity.

ACTIVITIES COMMON TO ALL CLASSROOMS

The instructional activities were the same in all classes. At the end of the 3-week unit, all classes completed the same achievement test. They worked individually on the test and did not receive help from the teacher or from other students.

Results[1]

Students learning the material in small groups and those learning in the whole-class setting obtained nearly identical achievement scores, on the average (small groups: $M = 16.5$, $SD = 7.0$; whole class: $M = 16.3$, $SD = 7.4$). The slight difference between means was not statistically significant (F controlling for ability $= 0.02$, $p < .85$).

Small Group Setting

INTERACTION AND ACHIEVEMENT

Table 1 presents means and standard deviations of the interaction variables, ability, and achievement, and the correlations between interaction variables and achievement. Partial correlations controlling for ability are presented, in addition to zero-order correlations to help clarify the direction of the relationship between interaction and achievement. Each interaction mean in Table 1 represents the frequency of occurrence per 45-minute class period.

Two of the three categories of interaction found by previous research to relate to achievement were significantly related to achievement in this study: giving explanations and receiving no explanations. In contrast to previous findings, receiving explanations was not significantly related to achievement. A further surprising finding was the negative relationship between receiving responses to procedural questions and achievement. These findings were sustained when ability was controlled.

As in previous studies, receiving no explanation in response to a question or error had the greatest relationship with achievement. Students who frequently received no response to their questions or errors or who received only the correct answer without an explanation obtained lower achievement-test scores than students who had this experience less often. Further, the negative impact on achievement of receiving no explanation in response to a *question* (partial $r = -.56$) was stronger than that of receiving no explanation in response to an *error* (partial $r = -.40$). The difference between the correlations, tested using Hotelling's (1940) test for the difference between correlations calculated for the same sample, was statistically significant ($t(66) = 3.93$, $p < .001$). Interestingly, the difference between the effect of receiving a terminal re-

---

[1] All correlations in this section are zero-order correlations unless otherwise noted.

TABLE 1

Means, Standard Deviations, and Correlation Coefficients of Achievement, Ability, and Small Group Interaction

Measure	*M*	*SD*	*r* with Achievement	Partial r^b
Achievement	16.5	7.0		
Ability	55.5	6.3	.35***	
Relative ability within group	0.0	5.5	.38***	
Gives explanation	6.4	8.6	.47***	.47***
Receives explanation	4.9	6.1	.02	−.01
Makes error, receives explanation	1.6	3.0	.04	.03
Asks for and receives explanation	3.3	4.8	.00	−.02
Receives No Explanation[a]	10.5	12.3	−.56***	−.58***
Makes error, is not corrected	4.4	6.4	−.35***	−.37***
Makes error, receives correct answer without explanation	0.9	2.3	−.25**	−.26**
Asks for explanation, receives no response	1.6	4.1	−.40***	−.40***
Asks for explanation, receives answer without explanation	1.2	2.6	−.30***	−.26**
Asks procedural question, receives no response	2.4	3.9	−.43***	−.49***
Receives response to procedural question	10.7	10.8	−.34***	−.33***
Gives short-answer feedback	20.7	19.5	.11	.07
Answers procedural question	8.9	8.0	.17*	.12
Corrects error	1.2	2.3	.06	−.02
Gives correct answer to problem	10.6	16.4	.04	.02
Performs calculations	28.1	22.8	.10	.09

[a] Composite = sum of measures.

[b] Partial correlation between interaction measures and achievement, controlling for ability.

*$p < .10$.

**$p < .05$.

***$p < .01$.

sponse to a question or error (the correct answer to part or all of a problem without an explanation) (partial $r = -.39$) was not significantly different from the effect of receiving no response at all (partial $r = -.50$) (Hotelling's $t(66) = 0.99$, $p < .15$).

Giving explanations was positively related to achievement. Students who gave many explanations during a class period showed higher performance on the achievement test than students who gave few explanations.

A surprising result was the significant negative relationship between receiving answers to procedural questions and achievement. The more frequently students received responses to procedural questions, the *lower* was their performance on the achievement test.

Three categories of interaction were not related to achievement: receiving explanations, giving short-answer feedback, and performing calculations. For the remaining analyses, only the findings for the three categories of interaction that were related to achievement are presented.

The effects of group ability composition on interaction and achievement. The three ability compositions compared here represent those examined in previous research: mixed-ability groups with high-, medium-, and low-ability students, and mixed-ability groups with high- and medium-ability students *or* medium- and low-ability students, uniform-ability groups with all medium-ability students. The present study, however, represents the first attempt to compare the effects of more than one type of mixed-ability group. Although the differences among the three ability compositions for all students are of interest, the focus here is on the effects of group composition on the achievement and interaction of medium-ability students. Two hypotheses were formed, one for all students and one for medium-ability students, based on the findings from earlier studies. First, it was hypothesized that for all students, mixed-ability groups with highs and mediums or mediums and lows would perform best and that uniform-ability groups would perform about the same as mixed-ability groups with highs, mediums, and lows. Second, a different ordering of group compositions was hypothesized for medium-ability students: mediums in high–medium or medium–low groups would perform best and mediums in high–medium–low groups would perform worst. Because previous research has presented a complex picture of interaction patterns in different group compositions, no hypotheses regarding the relationship between group composition and student interaction are presented here.

The findings for group composition for all students and for medium-ability students appear in Table 2. Tests of homogeneity of variance (Bartlett-Box F test, see Winer, 1971) showed that the variances of receiving no response to a procedural question for all students and the variances of giving explanations for medium-ability students were not equal across group compositions. The interaction scores were transformed using natural logarithms, which produced equal variances. The F-tests on the transformed scores are presented in the final column of Table 2. The results generally confirmed the hypotheses. For all students, those in high–medium or medium–low groups obtained higher achievement test scores, on the average, than students in the other group compositions. Although none of the interaction variables showed statistically significant differences across group compositions, the trends suggest that students in high–medium or medium–low groups tended to give more explanations than students in other group compositions.

The findings for medium-ability students partially confirmed the hypothesis for achievement. Medium-ability students in high–medium or medium–low groups performed best, but medium-ability students in uniform-ability and in high–medium–low groups showed similar performance. Unlike the results for all students combined, one interaction variable—giving explanations—did show significant differences across group compositions for medium-ability students. Students in high–medium or medium–low groups gave the most explanations, on the average, and students in high–medium–low groups gave the fewest explanations, on the average.

TABLE 2

Ability, Interaction, and Achievement of Uniform-Ability and Mixed-Ability Groups

	Uniform		Mixed 1[a]		Mixed 2[b]		
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*
ALL STUDENTS (*N* = 25, 33, 11)							
Achievement	15.4	6.4	16.3	7.7	19.5	5.7	2.65*[c]
Ability	54.7	3.5	56.9	7.5	53.0	6.9	1.96
Gives explanation	7.2	8.7	4.6	7.1	10.1	11.1	1.94
Receives no explanation	11.2	12.5	10.2	13.7	9.7	7.5	0.08
Receives response to procedural question	8.8	8.2	12.7	13.5	8.9	3.8	1.11
MEDIUM-ABILITY STUDENTS (*N* = 25, 8, 5)							
Achievement	15.4	6.4	14.1	6.1	21.8	6.4	2.99*[c]
Ability	54.8	3.5	55.8	2.9	54.3	3.0	0.42
Gives explanation	7.2	8.7	1.6	3.1	14.7	15.1	3.33**
Receives no explanation	11.2	12.5	13.9	17.6	10.4	10.1	0.15
Receives response to procedural question	8.8	8.2	12.9	11.8	8.0	5.2	0.74

[a] High-, medium-, and low-ability students in a group.

[b] High- and medium-ability *or* medium- and low-ability students in a group.

[c] Analysis of covariance, covariate equals ability.

*$p < .10$.

**$p < .05$.

Student Characteristics Predicting Interaction and Achievement

Of the four student characteristics examined here, only relative ability within the group confirmed the hypothesized relations. Relative ability was positively related to giving explanations ($r = .23, p < .04$) and to achievement ($r = .38, p < .001$). Absolute ability was related to achievement ($r = .35, p < .001$) but did not relate to any interaction category (correlations ranged from $-.11$ to .10).

The personality measures showed different relationships with interaction and achievement. Extroversion–introversion did not relate to achievement or to any interaction category (correlations ranged from $-.15$ to .16). Because the positive and negative scales of the intellectual achievement responsibility scale were not highly correlated ($r = .25$), they were analyzed separately. The positive scale showed negative relationships with achievement and giving explanations ($r = -.17, p < .08$; $r = -.22, p < .04$). Contrary to a logical expectation, students who perceived that the responsibility for positive achievement outcomes resided within themselves obtained *lower* achievement test scores and gave *fewer* explanations than students who perceived that the responsibility for positive achievement outcomes resided in others. The negative scale showed a similar finding for giving explanations ($r = -.29, p < .01$) but was not related to achievement ($r = -.13$).

CAUSAL MODEL

To take into account multiple variables simultaneously and to test the sequential hypothesis that interaction in the group mediates the effects of student and group characteristics on achievement, a causal model was constructed and tested in which student interaction mediates the effects of input characteristics on achievement. Because ability and relative ability within the group were highly correlated ($r = .87$), only relative ability was included in the causal model. Because group composition was a nominal variable with more than two categories, it was not included in the model. The causal model should not, therefore, be considered a complete test of the sequential hypothesis.

To obtain the most parsimonious representative of student interaction for inclusion in the causal model, a stepwise multiple-regression analysis was performed with the three interaction categories predicting achievement. (The correlations among the interaction categories ranged from $-.08$ to $.42$). When giving explanations and receiving no explanations were taken into account, receiving responses to procedural questions did not predict achievement ($F(1, 65) = 2.16, p < .15$, change in $R^2 < .02$). Therefore, giving explanations and receiving no explanations were used as the interaction variables in the causal model.

The model was tested using path analysis (see Bentler, 1980; Duncan, 1975; Wolfle, 1980). The best fitting model appears in Figure 1. The model in Figure 1 shows that interaction in the group is a potent predictor of achievement even when student characteristics are taken into account. It partially supports the hypothesis that interaction mediates the effects of student characteristics on achievement. Giving explanations fully mediated the effects of intellectual responsibility (negative scale) on achievement; it partially mediated the effects of relative ability within the group. Receiving no explanation, however, was not predicted by any student characteristic.

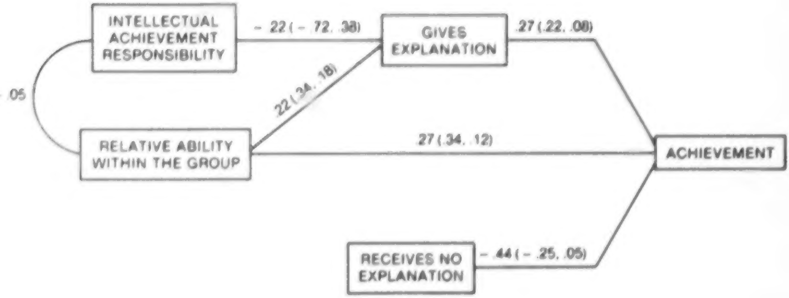

Figure 1. Path model of student characteristics, interaction, and achievement. (Numbers without parentheses are standardized partial regression coefficients. Numbers in parentheses are unstandardized partial regression coefficients and standard errors. Number on curved line is zero-order correlation coefficient.)

Whole-Class Setting

INTERACTION AND ACHIEVEMENT

Table 3 presents means and standard deviations of the interaction variables, ability, and achievement, and the zero-order and partial correlations between interaction variables and achievement. Each interaction mean in Table 3 represents the frequency of occurrence per 45-minute class period.

What is striking about the data presented in Table 3 is the infrequent occurrence of student interaction. Only one interaction variable related to achievement: receiving help from the teacher. Not surprisingly, students who received help from the teacher showed higher achievement than students who did not receive help from the teacher. The lack of relationship between the other interaction variables and achievement may be partly explained by restriction of range. Students rarely worked with other students and did not often participate in other classroom interaction. In all further analyses presented here, receiving help from the teacher serves as the interaction variable.

STUDENT CHARACTERISTICS PREDICTING INTERACTION AND ACHIEVEMENT

Ability, extroversion–introversion, and intellectual achievement responsibility did not predict achievement or student interaction (correlations ranged from −.21 to .19) in the whole-class setting.

TABLE 3

Means, Standard Deviations, and Correlation Coefficients of Achievement, Ability, and Whole-Class Interaction

Measure	*M*	*SD*	*r* with Achievement	Partial r^a
Achievement	16.3	7.3		
Ability	55.8	6.8	.26	
Receives help from teacher	0.7	0.8	$.39^{**}$	$.45^{**}$
Receives help from student	0.2	0.4	.14	.06
Gives help to student	0.3	0.6	.17	.10
Works with another student (nonspecific)	0.7	1.0	.11	.07
Gives correct answer to exercise	0.4	0.7	$.24^{*}$	.21
Gives incorrect answer to exercise	0.3	0.5	$.23^{*}$	.20
Asks question, receives no response	0.2	0.4	−.03	−.01

[a] Partial correlation between interaction measures and achievement, controlling for ability.

$^{*}p < .10$.

$^{**}p < .01$.

Aptitude–Treatment Interaction (ATI)

To test for ATI, a generalized regression analysis was performed on achievement. Following Peterson *et al.* (1981), the R^2 and F ratio for a term in the equation were calculated by stepping down from the full regression model without that term. Because ability and intellectual achievement responsibility (negative scale) were significant predictors in the explanatory model of achievement in the small-group setting, they served as aptitudes in the ATI analysis. Because different processes and outcomes appeared in the three small group compositions, they were considered three different treatments in the ATI analysis. The fourth treatment was whole-class instruction.

In the ATI analysis, only the effect for ability was statistically significant ($R^2 = .10$, $F = 11.57$, $p < .001$). Intellectual achievement responsibility accounted for less than 1% of the variance in achievement ($F = 0.45$, $p < .51$). The treatment effect accounted for 4% ($F = 1.49$, $p < .23$) of the variance. The ATI for ability accounted for 2% ($F = 0.61$, $p < .62$) of the variance in achievement and the ATI for intellectual responsibility accounted for 2% ($F = 0.93$, $p < .44$) of the variance.

Discussion

Small-Group versus Whole-Class Instruction

The lack of a significant main effect for achievement between small-group and whole-class settings replicates the findings by Peterson and Janicki (1979) and Peterson *et al.* (1981). This study shows the scarcity of interaction among students in the whole-class setting; most interaction occurred between teacher and student. These two findings suggest that the experiences of students in the two settings are different, but that the differences do not affect what is learned.

Student Interaction

The relationships between student interaction and achievement in the small-group setting in the present study generally replicate the results of several previous studies, but they also raise new questions. The positive relationship between giving explanations and achievement adds to the remarkably consistent results from other studies examining this interaction variable (see, for example, Peterson & Janicki, 1979; Peterson, *et al.*, 1981; Webb, 1980a, 1980b, 1980c, 1982b). The strong partial correlation between giving explanations and achievement controlling for ability lends support to the argument that giving explanations helps students learn, rather than the counterargument that giving explanations is a function of achievement level. Although the present study did not provide information about the cognitive mechanisms by which giving explanations helps students learn, a recent study by Bargh and Schul (1980) suggests an explanation: cognitive restructuring. Students giving explanations may reorganize the material for clearer presentation and, in the process, may clarify it for themselves.

The strong negative relationship for receiving no explanation in response to a question or error is also consistent with previous results (Webb, 1980a, 1980b, 1980c, 1982a, 1982b; Webb & Cullian, in press). Questions and errors probably indicated a lack of understanding or misunderstanding about how to solve the problems, and receiving no explanation left students unable to correct their errors or to discover how to solve the problems. Receiving a terminal response (the correct answer to part or all of a problem without an explanation of how to obtain it) was no more helpful than receiving no response at all. There was, however, a difference between the effects of receiving no explanation in response to *questions* and that of receiving no explanation in response to *errors*. The impact on achievement of receiving no explanation in response to questions was more severe than that of receiving no explanation in response to errors. This result suggests that students who made errors had a better understanding of the material than students who asked questions, especially because many of the students' questions signified lack of understanding.

The lack of a significant relationship in the present study between receiving explanations and achievement is consistent with some previous studies (Peterson & Janicki, 1979; Peterson *et al.*, 1981) but is inconsistent with others (Webb, 1980a, 1980b, 1980c, 1982a, 1982b). One possible explanation of the different results across studies is the age or ability level of the students giving the explanations. In the studies showing a positive relationship between receiving explanations and achievement, students were above-average high school or junior-high school students. In the Peterson *et al.* studies, students were fourth-, fifth-, or sixth-grade students, and in the present study, students were average-ability junior-high school students. It is possible that only above-average students at the secondary school level can provide effective explanations, whereas elementary school children or average students at other levels cannot. The finding in the present study that the teacher's explanations in the whole-class setting were positively related to achievement whereas the students' explanations in the small-group setting were not lends further support to the hypothesis that students' explanations were not effective for the recipient. Another possible explanation for the differential effects of receiving explanations across studies may be related to the subject matter being explained. The subject matters of the other studies included fractions, elementary school geometry, probability, algebra, consumer mathematics, and exponents and scientific notation, whereas the subject matter in the present study was area and perimeter. It may be easier to explain some subject matters than others. Further research at multiple grade levels, ability levels, and with a variety of subject matters is needed to clarify the hypotheses offered here.

The negative relationship between receiving responses to procedural questions and achievement is unexpected and puzzling. One would expect a positive relationship or no relationship, as found in a previous study (Webb, 1982b), but a negative relationship is counterintuitive. Closer inspection of the transcripts of group work revealed that many of the students who frequently asked procedural questions (for example, asking what questions other students were working on, or what answers other students obtained) were having difficulty following the progress of the group and often lagged behind. For these students, then, the high frequency of procedural questions may have been symptomatic of difficulty understanding the material. If a high frequency of asking procedural questions indicated a need for explanations, students in the groups did not recognize the need; procedural questions almost never elicited explanations. The negative relationship between receiving responses to procedural questions and achievement, then, may be a spurious relationship due to underlying difficulties of students asking many procedural questions, rather than evidence that receiving responses to procedural questions is detrimental for learning.

In the whole-class setting, the positive relationship between receiving help from the teacher is consistent with other research in large-group settings (see, for example, Rosenshine, 1979). The lack of relationships between achievement and giving explanations, receiving explanations and receiving no help in response to a question may best be accounted for by restriction of range. Students rarely gave help to each other. Furthermore, the incidence of asking a question and receiving no response was very low.

Predictors of Interaction and Achievement

The effects of group composition on achievement and interaction generally agreed with previous findings but a few exceptions appeared, as well as results of comparisons never investigated before. As found previously, students in high–medium or medium–low groups learned more than students in uniform-ability groups (Webb, 1982a) and high–medium–low groups and uniform–ability groups produced equal achievement (Webb, 1980a). The comparison between mixed-ability group compositions yielded the result hypothesized: high–medium or medium–low groups outperformed high–medium–low groups. The inconsistent result in the present study was the lack of a significant difference between the achievement of medium-ability students in uniform-ability and in high–medium–low groups. The results for student interaction showed the same pattern as the achievement results, with students in high–medium and in medium–low groups giving the most explanations and students in the other group compositions receiving the fewest responses to their requests for explanations. However, only the result for giving explanations among medium-ability students was statistically significant. The overall picture presented by the results of groups composition is the effectiveness of high–medium and medium–low mixed-ability groups in producing high achievement and student interaction beneficial for learning.

The importance of relative ability within the group as a predictor of giving explanations, in contrast to the nonsignificant effect of absolute ability, shows that it may be misleading to consider student characteristics apart from characteristics of the group. In this study, students of comparable ability had different experiences in group interaction when they were assigned to groups with different mean and variance in ability. The most able person within the group tended to become the "explainer," regardless of his or her absolute ability.

The results for the personality measures were unexpected. In contrast to previous research, extroversion–introversion was not related to achievement or to student interaction. Furthermore, the results for intellectual achievement responsibility were in the opposite direction from those expected. Students who believed that they could influence their achievement outcomes gave fewer explanations and showed lower achievement than students who believed that their achievement outcomes were determined by others or by fate. This result is contrary to those of Crandall and colleagues (Crandall *et al.*, 1965; Crandall *et al.*, 1962) who reported many positive correlations between intellectual achievement responsibility and achievement and occasionally found no relationship. More data are needed to explain this counterintuitive result.

Substantive and Methodological Issues

The results of the present study suggest two issues that should be taken into account in future research. First, *sequences* of student behavior were better predictors of learning than were isolated instances of student behavior. The combinations of the initial behavior (e.g., asking a question, making an error) and the response given (e.g., an explanation, the correct answer only, no response) were strong predictors of achievement. Merely examining the initial behavior (asking a question) would have little predictive value. The importance of examining sequences of student behavior also suggests that time-based rotating sampling systems, in which students are each observed for short intervals (in some studies as short as 10 seconds), may not be appropriate observation methods for obtaining information about student interaction in classroom settings.

The second issue concerns the procedures used to capture details of student interaction. Only with verbatim recordings was it possible to code reliably students' errors, different kinds of questions, and different kinds of responses that students gave each other. Furthermore, verbatim records made it possible to ascertain the content of errors, questions, and explanations, essential for understanding students' experiences in the learning settings. Knowing the content of the interaction made it possible to track students' conversations about specific problems over long periods of time, even when other students interrupted with interaction on a different topic. Given the complexity of student interaction, particularly in small-group settings, verbatim records are essential for capturing the interaction variables that are potent predictors of learning.

Acknowledgments

We wish to thank Denise Davis for her help in transcribing the audio tapes, Cliff Carr for his help in preliminary analyses, and Marian Graves, Audrey Kopp, Yasuko Morihara, and Beverly French for their assistance in this program of research.

References

Bargh, J. A., & Schul, Y. On the cognitive benefits of teaching. *Journal of Educational Psychology*, 1980, *72*, 593–604.

Bentler, P. M. Multivariate analysis with latent variables: Casual modeling. *Annual Review of Psychology*, 1980, *31*, 419–456.

Crandall, V. C., Katkovsky, W., & Crandall, V. J. Children's beliefs in their own control of reinforcements in intellectual-academic achievement situations. *Child Development*, 1965, *36*, 91–106.

Crandall, V. C., Katkovsky, W., & Preston, A. Motivational and ability determinants of young children's intellectual achievement behaviors. *Child Development*, 1962, *33*, 643–661.

Cronbach, L. J., Gleser, G. C., Nanda, H., & Rajaratnam, N. *The dependability of behavioral measurements*. New York: Holt, Rinehart & Winston, 1972.

Duncan, O. D. *Introduction to structural equation models*. New York: Academic Press, 1975.

Eysenck, H. J., & Eysenck, S. B. G. *Eysenck personality inventory*. San Diego, California: Educational and Industrial Testing Service, 1968.

Hotelling, H. The selection of variates for use in prediction, with some comments on the general problem of nuisance parameters. *Annals of Mathematical Statistics*, 1940, *11*, 271–283.

Johnson, D. W. Student-student interaction: The neglected variable in education. *Educational Researcher*, 1981, *10*, 5–10.

Peterson, P. L., & Janicki, T. C. Individual characteristics and children's learning in large-group and small-group approaches. *Journal of Educational Psychology*, 1979, *71*, 677–687.

Peterson, P. L., Janicki, T. C., & Swing, S. R. Ability x treatment interaction effects on children's learning in large-group and small-group approaches. *American Educational Research Journal*, 1981, *18*, 453–473.

Rosenshine, B. V. Content, time and direct instruction. In P. L. Peterson & H. J. Walberg (Eds.), *Research on teaching: Concepts, findings, and implications.* Berkeley, California: McCutchan, 1979.

Sharan, S. Cooperative learning in small groups: Recent methods and effects on achievement, attitudes, and ethnic relations. *Review of Educational Research*, 1980, *50*, 241–272.

Slavin, R. E. Cooperative learning. *Review of Educational Research*, 1980, *50*, 315–342. (a)

Slavin, R. E. Cooperative learning in teams: State of the art. *Educational Psychologist*, 1980, *15*, 93–111. (b)

Webb, N. M. Group process: The key to learning in groups. *New Directions for Methodology of Social and Behavioral Science: Issues in Aggregation*, 1980, *6*, 77–87. (a)

Webb, N. M. A process-outcome analysis of learning in group and individual settings. *Educational Psychologist*, 1980, *15*, 69–83. (b)

Webb, N. M. An analysis of group interaction and mathematical errors in heterogeneous ability groups. *British Journal of Educational Psychology*, 1980, *50*, 1–11. (c)

Webb, N. M. Predicting learning from student interaction: Defining the interaction variables. *Educational Psychologist*, 1983, *18*, 33–41.

Webb, N. M. Group composition, group interaction and achievement in cooperative small groups. *Journal of Educational Psychology*, 1982, 74, 475–484. (a).

Webb, N. M. Peer interaction and learning in cooperative small groups. *Journal of Educational Psychology*, 1982, 74, 642–655. (b).

Webb, N. M., & Cullian, L. K. Group interaction and achievement in small groups: Stability over time. *American Educational Research Journal*, in press. (b).

Winer, B. J. *Statistical principles in experimental design* (2nd ed.). New York: McGraw-Hill, 1971.

Wolfe, L. M. Strategies of path analysis. *American Educational Research Journal*, 1980, *17*, 183–210.

CHAPTER 10

Talking and Working Together: Status, Interaction, and Learning*

ELIZABETH G. COHEN

Introduction[1]

When classmates interact on a school task, some students are more active and influential than others. Teachers and researchers have observed that these more dominant students are likely to be the high achievers and/or the more socially influential members of the class. In an early study, Zander and Van Egmond documented this effect in groups of third-graders who were given the task of guessing the number of beans in a bottle. The investigators found that successful influence was related to having a higher IQ, having higher social power, and being male (1958).

It is not surprising to find that higher achievers are influential on an academic group-task; they are seen as expert by the group and are a valued resource for the success of the entire group. But why should socially influential children, or boys in comparison to girls, be treated as expert by the group? Sex and social power do not seem rational as a basis for perceived expertise.

Expectation States Theory, a general sociological theory, offers the educational researcher a way to analyze and explain these phenomena. Expectation States Theory (Berger, Cohen, & Zelditch, 1972) attempts to explain the process by which status characteristics of group members become the basis for expected competence on collective tasks. A large body of theory and research, mostly in laboratory settings, has provided extensive support for many of the propositions and derivations from the theory (for a review of this literature, see Berger, Rosenholtz, & Zelditch, 1980).

---

*Research for this paper was supported by NSF Grant # SED 88–14079 and a contract with NIE: G-80-0217.

[1] The author is indebted to Barbara Anthony for assistance in every phase of the data analysis.

THE SOCIAL CONTEXT OF INSTRUCTION
Group Organization and Group Processes

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.

A status characteristic is a generally agreed upon social ranking in which there are at least two ranked states. There are several different kinds of status characteristics; some refer to more general social distinctions such as race or sex—these are called *diffuse status characteristics*. Others are more specific and refer to distinctions of perceived ability on more specific tasks; the prime example of such a *specific status characteristic* in a classroom is reading ability.

Research shows that status characteristics, whether diffuse or specific, tend to become salient in new collective tasks where they have no direct relevance to the task at hand. This occurs through the medium of beliefs presuming superior competence of individuals with higher social status; these expectations regarding an individual's competence tend to generalize to group interaction on tasks having nothing to do with the status distinction. As a result, higher-status individuals will be more active and influential than lower-status individuals in the group task.

The theory specifies scope conditions; these are conditions sufficient for differential status to become the basis for organizing expectations for competence on new tasks. More than one actor must be involved in a collective task that demands that actors evaluate each other's contributions. Group members believe that the contributions will affect the success or failure of the outcome. Finally the groups must be distinguished on at least one status characteristic.

Application of the Theory to Classroom Interaction

From a theoretical point of view there are multiple status characteristics capable of becoming salient in interaction in the classroom. First, there are differences in perceived expertise in the subject matter of the task at hand. If the teacher has assigned a task the group perceives as a math problem, then those with better grades in math will be deferred to as expert. They will be more active and influential than other group members. This is the operation of a specific status characteristic (such as perceived math ability) with a *direct path of relevance to the task* (Humphreys & Berger, 1981).

Second, there are specific status characteristics without a direct path of relevance to the task, but nonetheless capable of becoming the basis for expected competence on classroom tasks. Among elementary school students, perceived reading ability has been shown to function as a status characteristic in groups working on a task that requires no reading or other academic skill. Stulac first demonstrated this effect with students from different classrooms who were told that they performed "high" and "average" on a test of reading ability. These ratings agreed with the students' self-ratings on a recruitment questionnaire asking about their reading ability in comparison to that of their classmates. In untreated four-person groups playing a simple board game that required collective decisions, the "highs" were more active and influential than the "average" students (Stulac, 1975).

Rosenholtz studied the effect of perceived reading ability on interaction among classmates. Each student was asked to rank all other same-sex students on how well they read. She divided the students into high, medium, and low on the basis of the average ranking assigned to each individual by classmates. Four-person groups were composed of children who were of the same sex and perceived social power and who were not close friends. Each group contained two students who held higher average rank on reading ability than the two other students. Groups were asked to play the same board game used in the Stulac study. Results showed that in the groups with high and medium readers, the highs were more active and influential than the mediums. Likewise, in the groups with average and low readers, the average readers were more active and influential than the lows (Rosenholtz, in press). Reading ability was also found to act as a status characteristic in racially integrated classrooms; those who were seen as better readers were more active and influential on the board game in all-black groups and in interracial groups where whites were the high readers (Cohen, 1982).

Reading ability is of central importance in elementary school classrooms because it often becomes a prerequisite for successful participation in instructional activities. Reading is often used by teachers and students as an index of how smart a student is. Thus it is not surprising to find that peers use perceptions of reading ability as an index of some more general problem-solving ability when they are engaged in group tasks in the classroom.

The strength of reading ability as a specific status characteristic appears to stem partly from the formal organization and evaluation system of the classroom. The level of consensus on ranking based on reading ability has been shown to be related to the teachers' instructional practices (Rosenholtz & Wilson, 1980).

The informal social organization of the classroom produces other specific status characteristics. For example, some children are far more attractive and popular than others; attractiveness has been shown to function as a status characteristic. (See Berger *et al.* [1980] for a review of this literature.) In a sample of racially integrated classrooms, Cohen (1982) concluded that there were a number of alternative status characteristics that were capable of affecting the rate of interaction and influence on collective tasks. In many of these classrooms, there was a negative or insignificant relationship between rank of reading ability and rating of social influence.

In addition to specific status characteristics there are diffuse status characteristics relevant to classroom interaction. In mixed-status groups of school children playing the board game described previously, whites are likely to be dominant over blacks (Cohen, 1972), Anglos over Chicanos (Rosenholtz & Cohen, in press); Anglos over Canadian Indians (Cook, 1974); and, in Israel, Jews of Western origin over Jews of Middle Eastern origin (Cohen & Sharan, 1980). Lockheed has had rather mixed results in testing the effects of sex as a status characteristic among classmates with the same task; sex appears to work as a status characteristic among fifth-graders but not fourth-graders (Harris and Lockheed, 1982).

Most of the research on status characteristics in educational settings has involved assigning collective tasks to groups of students, so that the precise scope conditions specified by the theory are met. However, in actual classrooms, teachers rarely delegate collective tasks to small groups of students. Thus an important question remains unanswered: Is there evidence in ongoing classrooms of the operation of status characteristics even when scope conditions concerning collective tasks are only partly met? And if status characteristics do operate to depress participation, do lower rates of interaction have negative effects on learning for low-status students?

This study hypothesizes that classroom social status affects the frequency of student interaction; interaction, in turn, affects the amount of learning in a specific curriculum. At the same time that talking and working together facilitates learning, children who have higher social status in the classroom have more access to interaction as a resource for learning. Expectation States Theory is used to analyze the sources of status and to explain their effects on peer interaction at learning centers in an ongoing classroom setting. A path model illustrates how classroom peer interaction can simultaneously have positive and negative effects on learning.

Method

The data for this analysis were taken from a large project studying the organizational conditions for implementation of a complex bilingual curriculum designed to teach thinking skills. This curriculum, *Finding Out/Descubrimiento,* was developed by Edward De Avila; it uses math and science concepts in challenging tasks requiring repeated use of the same concepts in very different media and modes. The curriculum features multiple learning centers each with different materials and activities. Over a period of 15 weeks, for 1 hour per day, children are required to complete each learning center and to fill out the worksheet that accompanies the task. The learning centers operate simultaneously with four or five children working at each center. Instructions are available with each learning center; they are printed in English, Spanish, and pictographs.

Nine bilingual classrooms, Grades 2 through 4, participated in the project; there were 307 children and 9 teacher–aide teams. The schools were located in five districts in the San Jose area. Teachers were all volunteers from the staffs of schools that were members of the Bilingual Consortium, an organization that provides support for staff and curriculum development.

The classes were made up largely of children of Hispanic background with a small proportion of Anglos, Blacks, and Asians. Parental background was working class and lower white-collar with a few children from welfare families. There was great diversity of academic skills as measured by the California Test of Basic Skills (CTBS). Some of this diversity in test results comes from the lack of English proficiency in many of the students. Achievement tests were administered only in the English language version. Children limited in English were not necessarily proficient in Spanish. Many tested as limited in both English and Spanish.

The data used for this analysis were behavioral observations, questionnaires, and test scores collected on a group of target children within each of the nine classrooms. There were actually two sets of target children selected for different purposes in each classroom. For the purpose of this analysis, the two groups are combined. The bases of selection were (*a*) varying levels of proficiency in English and Spanish and (*b*) selection by the teacher as likely to have the most difficulty in the math–science area. Measures of status were derived from a sociometric questionnaire given to all students in the fall of the experimental year.

Because all teachers and aides were bilingual and the materials for the curriculum were in two languages, the children who were not proficient in English had equal access to the learning resources. It is important to point this out, because in many bilingual classrooms, children who are not proficient in English are not able to interact on the task because they do not understand what is being asked of them and fail to comprehend the learning materials. Teachers used both languages, often translating the same sentence into the other language. There was no tendency to use Spanish for behavior management and English for instruction.

Analysis of Collective Task Conditions in the Curriculum

In the case of this curriculum, children were rarely assigned to work together to produce a joint product or to make joint decisions as in all the previous Expectation States work on school children. Instead, the children were working in shifting groups at learning centers. They were responsible individually for completion of the task and worksheet at each learning center.

However, there were some special features of the social structure that produced brief interdependencies between the students. Students were given the following two rules: You have the right to ask anyone at your learning center for help. You have the duty to assist anyone at your learning center who asks for help. Because the tasks were highly challenging and always novel and the students were compelled to complete the worksheet, there was strong motivation for using each other as resources.

Grouping was temporary and heterogeneous. After finishing one center a student would select a new center that did not already have the posted limit of students working at it. This feature meant that students would have the chance, over time, to work with practically every other student in the class.

In general, the level of interaction was very high. However, in some classrooms, teachers were reluctant to delegate authority to lateral relations between students. In these classrooms there were fewer learning centers in simultaneous operation; the teacher attempted direct supervision by assigning groups to herself and the aide. Thus, to some extent, the amount of interaction that a child could experience was a function of how willing the individual teacher was to let go and allow multiple learning centers to operate without constant supervision (Cohen & Intili, 1981). Teachers and aides who were able to delegate more authority to the learners frequently helped students to complete their tasks, particularly those students who were disengaged. There was very little direct instruction except in orienting the whole class to each new learning center.

Variables in the Path Model

In testing the effects of status it was essential to control on more objective differences in relevant skills that might function as an important resource for students. The tasks in this curriculum called for some academic skills such as reading and computation, in addition to other skills not well represented in conventional curricula, such as reasoning, manipulative, and problem-solving skills. Thus it was important in testing any hypothesis on the effects of status on interaction, to control for relevant pretest scores. The following hypothesis was tested:

Holding constant pretest scores on a measure reflecting the curriculum content, the probability of talking and working together is related to the status of the student.

Earlier analysis of implementation and learning had already demonstrated that the rate of talking and working together was related to learning outcomes among this set of target children. This was especially the case for the content-referenced test, called the Mini-Test (Cohen & Intili, 1981). If status-organizing processes were at work, children with the same learning characteristics who were different in status characteristics could be shown to have differential access to an important channel of learning. The path model adds the status effects to what is already known about the major behavioral and pretest predictors of learning on this curriculum.

Measurement

Learning Outcome Measures

A content-referenced test especially constructed to measure learning outcomes of this curriculum was used as the dependent variable in the path analysis. In addition we used the standardized achievement test used in the fall and spring in these California classrooms. The measure of English proficiency was the Language Assessment Scale developed by De Avila and Duncan. This test requires the child to tell a story in English and in Spanish. All three of these tests were administered before and after the curriculum.

Measures of Status

The sociometric instrument used in this study consisted of eight questions— each followed by a list of students enrolled in that particular classroom. The subjects were asked, for example, to choose the students in their class who were best at math and science. Or they were asked to select the students who had the most trouble with reading. The students then identified their choices by circling the appropriate names on the list following each question. There was an English and a Spanish version of the instrument. Great care was taken in the administration of this instrument to be sure that each child could understand the directions and could recognize the names of classmates.

Because students could check off any number of names, there was a variable number of choices made for each criterion question between classrooms. The distribution of choices on each of the questions was divided into quintiles for each classroom. Each child was then assigned a score ranging from one to five, depending on the fifth of the distribution in which the number of choices she or he received lay.

Measures of Interaction

Observers visited classrooms during the operation of the curriculum once a week to score the behavior of target children. They used a special interaction-scoring device for this purpose that measured performance outputs of the child relevant to the task. Interaction measures were closely related to the small-group scoring system developed from the theory and used on small-group interaction in more controlled settings.

The purpose of the target-child observation was to obtain timed observations of task-related behavior. The observer began the scoring period for each child by recording the nature of the activity and grouping pattern in which the child was operating. If the child were found reading or writing during the 3-minute observation period, the observer checked this off on the cover-page. For each 30-second interval of a 3-minute period the observer would record the frequency of task-related talk, and the frequency of selected nonverbal behaviors: working alone or together on the curriculum, off-task behavior, as well as other behaviors not directly relevant to this analysis. In addition to scoring talk, the observer recorded whether the target of the talk was peer or adult. The reliability of this instrument was assessed by the following formula:

$$\frac{\text{Number of disagreements of scorer with criterion scorer}}{\text{Total possible points of disagreement between two scorers.}}$$

The average percentage agreement for this instrument was .90 over the 24 times reliability was assessed.[2]

The two variables of interest here are the rate of task-related talk with peers and the observed frequency of working together on the curriculum with peers. Task-related speech was scored by a single check as long as it went uninterrupted by another student talking or by a change into talk that was not task-related within the 30-second interval. If the speech went on into the next time interval it was checked again. To calculate across observations an average rate of talking the total frequency of these speeches was divided by the number of observations for that child.

---

[2] The reliability of the target-child instrument was assessed in two phases. In the first phase, each classroom observer was paired with a supervisor who scored alongside the observer. No observer was allowed to score on his or her own until a satisfactory level of agreement with the supervisor's scoring was reached. This was calculated by comparing the total number of checks made by the observer and the supervisor for a scoring period for each category on the scoring instrument. An acceptable level of agreement was defined as .90. During the actual scoring, each observer received visits from one of the supervisors. Reliability checks were made at that time.

In order to be sure that there was sufficient stability in the measures taken of a given child to justify this aggregation procedure, an analysis of variance was carried out on frequency of talk for different observations taken on the same child. This analysis showed that there was more difference between observations taken on different children than within the set of observations taken on the same child ($F = 1.39$; $p < .009$).

The other critical variable was the rate of working together with peers. As with the rate of talking, the child was a significant source of variance in the frequency of this behavior per observation ($F = 1.28$; $p < .033$). The indicator of task-related interaction in an interdependent work relationship is an index based on these two variables, called Rate of Talking and Working Together. The index was formed as follows:

$$\left(\frac{\Sigma T}{N}\right)\left(\frac{\frac{\Sigma WT}{\Sigma B}}{N}\right)$$

where T is the task-related speech, N the number of observations for that S, WT works together with peers, and B all scored activity (nonverbal codes).

This index of talking and working together has the effect of weighting talk by the frequency with which it occurs in an interdependent context. The frequency of working together is standardized on the scores of all other nonverbal activities, such as off-task behavior, waiting for the teacher, or working alone. If a child shifts frequently from one type of activity to another, the scoring scheme generates a higher frequency of working together than for a child who works steadily with another child throughout the observation. In order to prevent the former child from receiving a spuriously high score on working together, the frequency of working together is divided by the total number of activities checked.

Results

Interrelationship of Status Variables

After classrooms were made comparable by assigning a quintile score for the number of choices made for each child on each criterion question, the status variables were intercorrelated. In this analysis, friendship choices are used as an indicator of an Attractiveness Status Characteristic.[3] Although athletic reputation has never been tested

---

[3] Attractiveness does not mean only physical attractiveness. Any child who receives many choices as "best friend," can certainly be described as highly attractive to other children.

TABLE 1

Intercorrelation of Fall Status Measures and Rate of Talking and Working Together

	Read High	Read Low	Math-Sci High	Friends High	Sports High	Talk-Work
Read High[a]	1.00	-0.562^{***}	0.770^{***}	0.558^{***}	0.448^{***}	0.221^{*}
Read Low		1.00	-0.49^{***}	-0.364^{***}	-0.182^{**}	-0.213^{*}
Math-Sci High			1.00	0.502^{***}	0.571^{***}	0.243^{**}
Friends High				1.00	0.502^{***}	0.209^{*}
Sports High					1.00	0.198^{*}
Talk-Work Together						1.00

[a] Read High represents the frequency of choices received by each child from classmates on who was best in reading. The choices in each classroom are converted to quintile scores in order to standardize for varying numbers of choices between classrooms.

$^{*}p < .05.$

$^{**}p < .01.$

$^{***}p < .001.$

as a status characteristic, it was included here because of the high probability that it acts as an important basis for status among schoolchildren. Table 1 shows the correlation coefficients for the following criterion questions: Best in Reading; Most Trouble with Reading; Best in Math and Science; Best in Games and Sports; Best Friends. Table 1 also includes the correlations of each of these status criteria with the rate of talking and working together. This table is based on the larger sample when intercorrelations are made on the status variables. In the column with the behavioral measure the *N* drops to 101, the number of target children on whom we have systematic behavioral observations.

Table 1 shows a very high level of intercorrelation between status criteria measured in the fall. Children who were more frequently chosen on academic criteria were also more frequently chosen on friendship and athletic criteria. There is a correlation of .77 between being chosen on Math and Science and being chosen on Reading. At first glance, it looks as if academic status might be the major basis for friendship choices and for choices of athletic status. However, it is equally likely that choices for academic status stem from friendship or athletic status.

All the status variables are significantly correlated with the rate of talking and working together, in the expected direction. The strongest correlation is between Math-Science and interaction ($r = .243$). This would be expected on theoretical grounds because perceived expertise in math and science should have a direct path of relevance to many of the curriculum's activities. In looking around for help, the children might well have judged those who were seen as best in math and science as the most expert source of assistance. However, it should be noted that other status criteria are not markedly weaker than Math-Science in predicting interaction.

Test of the Status Hypothesis

A compound status score of the Attractiveness Status Characteristic and the Math–Science Characteristic was used to test the hypothesis on effect of status on interaction, holding constant pretest scores. In a multicharacteristic situation, actors will combine characteristics, present in the situation, that have direct and indirect paths of relevance to the tasks (Humphreys & Berger, 1981).

The Math–Science Characteristic was chosen for its direct path of relevance. The Reading Characteristic was not included because it was too highly correlated and would amount to counting the same characteristic twice.

As mentioned previously, there is no study showing the effect of Athletic Status on collective tasks. In using the Attractiveness Status Characteristic, the index reflects at least one of the alternatives to academic ability as a source of status in the classroom. The index, referred to as CoStatus, is a simple total of the quintile scores on the two status characteristics for each target child.

When Talking and Working Together is regressed on CoStatus and on the pretest score of the content-referenced Mini-Test, CoStatus has a statistically significant beta weight, but the pretest score does not. In other words, the perceived status variable is a more powerful predictor of interaction than the more objective measure of relevant knowledge. The R^2 accounted for by these two variables is very small (.079). The rate of talking and working together is greatly influenced by the way in which the teacher implemented the curriculum. There is no measure of this classroom variable represented in this particular regression.

The Path Model

The path model depicting the hypothesized relationships between status, interaction and learning is presented in Figure 1. The path coefficients have been entered into the diagram. Not all the relationships pictured in this model were clearly hypothesized prior to testing. It was clear because of the theoretical framework of the study

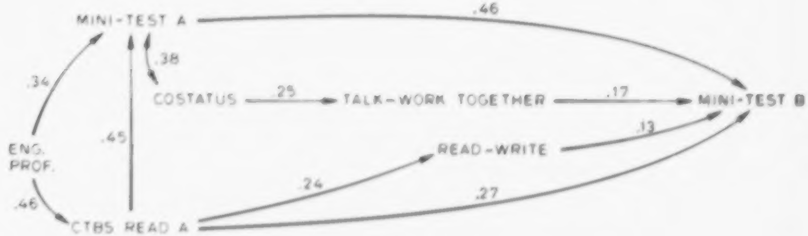

Figure 1. Path Model.

that the measures of status taken in the fall were causally prior to the observed rate of talking and working together. This behavior, in turn, was an antecedent variable of the test on the curriculum given in the spring.

Prior analysis of learning outcomes had shown the powerful effects of pretest on posttest scores as well as the importance of the observed frequency of reading and writing on posttest scores (Cohen & Intili, 1981). The various pretest scores were highly intercorrelated. The zero-order intercorrelations of all the variables represented in the path model may be seen in Table 2. The *N* represented in the table refers to the sample size for each regression represented by the path coefficients. There was a somewhat different *N* for different regression equations because of differences in the missing data for the variables involved.

Because there were no strong a priori notions of the role of the various pretests in the model, a number of different patterns were tried before finding one that neither over- nor underestimated the observed relationships. The final model in Figure 1 provided very close estimates of the observed correlations when the expected correlations were recomputed by combining the paths in the model.

The data show a clear relationship between status characteristics and peer interaction, even when the amount of knowledge about the curriculum prior to its start is controlled. The statistically significant path coefficient between interaction and learning is particularly important in light of the multiple controls; other significant predictors of the posttest score are the Mini-Test pretest score, the CTBS Reading pretest score, and the observed frequency of reading–writing.

The level of English proficiency in this model is causally prior to both the CTBS Reading pretest (administered in English) and the Mini-Test pretest (but not the posttest). Both English proficiency and the reading achievement pretest scores are significant predictors of the pretest score on the Mini-Test.

TABLE 2
Intercorrelation of Variables in Path Model

	Mini-Test B	Talk–Work	Read–Write	CoStatus	Mini-Test A	Eng. Prof.	CTBS Read
Mini Test B	1.00	.217*	.220*	.338***	.641***	.530***	.583***
Talk–Work	76[b]	1.00	.027	.274**	.087	.206*	.023
Read–Write	76	76	1.00	.269**	.036	.090	.238*
CoStatus	93	93	79	1.00	.380***	.221*	.232*
Mini-Test A[a]	76	76	76	93	1.00	.545***	.607***
Eng. Prof.[a]	95	95	79	79	95	1.00	.460***
CTBS Read[a]	76	76	76	79	76	81	1.00

[a] All these test scores are pretests, taken before the curriculum.

[b] The *N*'s are given in the bottom half of the table.

*$p < .05$.

**$p < .01$.

***$p < .001$.

The relationship between the status variable and the Mini-Test score is pictured as a double-headed arrow in this model. To some extent, both variables undoubtedly reflect prior academic evaluations and objective knowledge. In this model, background intellectual and achievement variables are represented by the CTBS score and by the English proficiency score. Several alternative models that attempted to link the reading achievement score or the English proficiency score directly with the CoStatus variable resulted in a failure to recompute the observed correlations.

Discussion

Effect of Status on Peer Interaction

The results are supportive of the proposition that even the momentary interdependencies of students are sufficient to make status characteristics salient and relevant to expected competence on curricular tasks. In the most recent review of Expectation States Theory, Berger *et al.* (1980) state that status-organizing processes will take place *at least under the following conditions:* Groups are engaged in *tasks,* that is, actions in which there is (*a*) a goal, (*b*) some idea of the difference between success and failure in achieving the goal, and (*c*) some idea that the contributions of group members affect success and failure in achieving it. A second major scope condition is that the theory deals only with *groups,* that is, sets of two or more individuals who think of themselves as jointly responsible for the outcome and who are therefore oriented toward a collective decision.

In this instance, the student was not jointly, but individually responsible for a final product (the worksheet). The situation studied meets these scope conditions only if one defines as *the collective task* the much smaller unit of the specific question or problem that brought the children into conversation, perhaps just for a few moments. Typical comments between children might be "What are you supposed to do here?" "Why doesn't my scale balance?" "I don't think that's right; go back and measure it again." They sought out and received much assistance in filling out worksheets.

Even though these would not ordinarily be seen as collective tasks, they appear to be sufficient to activate status-organizing processes. This is significant from a theoretical and an applied point of view. Theoretically, the scope condition might well be described more loosely as a situation that forces people to make evaluations of each other's contribution, whether or not the group or the individual is responsible for the end product. From an applied point of view, this is the first time that the operation of status characteristics has been clearly documented in a normal operating classroom. Therefore the theory can be used to illuminate not only formal groupwork tasks in classrooms, but more casual task-related peer interaction processes as well.

The intercorrelations of status characteristics suggest that there are multiple sources of status with similar effects on peer interaction. Furthermore, there is a snowball effect moving from the high state on one status characteristic to the high state on another. Thus there are correlations between being seen as good in games or sports, or being popular as a friend, and receiving high ratings on academic criteria.

A common question raised by critics of work on reading ability as a specific status characteristic is How do you know that the observed dominance of students with high reading-status is due to status and not to some more objective resource (represented in measured reading-achievement) that is actually more valuable to the group? Because classmates' rankings on reading ability are typically so closely related to teacher's rankings and to objective test scores, it is usually impossible to pull them apart with correlational techniques.

Because of some peculiar features of the bilingual classroom it is possible to disentangle this process. Children who are not proficient in English receive, not surprisingly, lower numbers of choices on being good in math and reading than children who are fully English proficient. Yet some popular children who are not English proficient receive high ratings on academic criteria. For the children who are not proficient in English, there is a sufficiently loose relationship between status and test scores, to highlight the effects of status on interaction. Even when reading pretest scores are controlled, there is a significant partial correlation coefficient between reading status and interaction, controlling on the pretest reading score (0.216; $p < .05$; $N = 73$). For the fully English proficient, the correlation between perceived reading status and actual reading score was so strong that when the reading score was partialled out, there was no relationship between the status score and interaction (.006; $N = 26$).

The Path Model

The relationship of peer interaction to learning is of special significance to the educational researcher. Holding constant two pretest scores and the observed frequency of reading and writing, the more the children talked and worked together, the more they learned from the curriculum. It should of course be kept in mind, that learning took place among the peers partly because there were superbly engineered and pretested learning materials at hand for the peers to talk about. The curriculum was built on careful developmental and learning principles; all the materials were prepared in advance so that students had only to open the box for each learning center. The researcher who wishes to document learning gains as a result of peer interaction must be sure that the quality of the curriculum materials is good enough to produce learning; it does no good for peers to discuss unintelligible or poorly planned and chosen materials.

Peer interaction probably had multiple functions in the context of this curriculum. It surely acted to reduce uncertainty as the children found their way through the complex directions on novel tasks. As in the organizational literature, interdependence of the workers is highly effective in reducing uncertainty when the task is complex. Other analyses of the data suggest special benefits of interaction when the dependent variable under consideration is conceptual learning. For example, holding constant the pretest score, interaction is related to the CTBS math posttest score on word problems (Math Applications), but not to the score on computation. The Mini-Test used in the path model represents a combination of the concepts of the curriculum and new scientific and mathematical vocabulary. In addition to assisting the children with the understanding of the concepts, interaction probably gave them a chance to commit the new vocabulary to working memory.

Why did reading and writing have an effect on the posttest score? Reading and writing reflected the filling out of worksheets and the finishing of more learning centers. Reading and writing are partly an indicator of the implementation of the curriculum in that classroom and partly an indicator of the educational value of filling out the worksheets. The more worksheets a child completed, the higher was his or her posttest score. It was also the case that some classrooms put much more emphasis on worksheets than others (Anthony, Cohen, Hanson, Intili, Mata, Parchment, Stevenson, & Stone, 1981).

At the same time that the path model depicts the favorable effects of peer interaction on learning, it shows the negative effects of status. In this interactional system, those children with high social status have more access to peer interaction that, in turn, assists their learning. In other words, the rich get richer. This is the dilemma of using peer interaction; at the same time that it increases engagement and provides a strong potential for learning, it makes the status structure of the classroom salient and allows it to become the basis of the prestige and power order within the interacting classroom group.

The simplest and most effective treatment for this problem, developed from Expectation States Theory, is the use of a multi-ability introduction to the peer interaction. If children can be made to understand that there is not just one ability that is relevant to new learning tasks, but a number of unrelated abilities, then expectations on the basis of preexisting status characteristics will be weakened as they combine with the mixed expectations based on multiple relevant abilities (Cohen, 1982; Rosenholtz, in press).

In the 3-day workshop prior to the curriculum, teachers were warned about the possibility of status effects. They were told how to give multi-ability introductions. However, they were so busy trying to stay one step ahead of a dozen or so new learning center tasks every week that they never followed this instruction. In the current implementation of the curriculum, considerable time is being spent in having teachers practice these multi-ability introductions to each learning center.

TEST SCORES IN THE MODEL

Figure 1 illustrates the pattern of test scores providing the best fit to the data. The reason that the English proficiency score and CTBS Reading score are causally prior to the Mini-Test, even though the Mini-Test did not require reading skill or understanding of English, lies in the nature of the Mini-Test. There was a strong vocabulary component; children who are not proficient in English are not necessarily highly proficient in Spanish. Even if they spoke Spanish fairly well, they were unlikely to know scientific terms in Spanish. Thus, limitations in vocabulary would effect both the reading score and the Mini-Test score.

CTBS Reading retained a direct effect on the Mini-Test posttest score (.27) although less than its effect on the pretest score (.45). It also had an indirect relationship to the posttest score that was mediated by reading and writing. The curriculum required the children to read and write; obviously deficiencies in reading skill lowered the probability of these behaviors. It was nonetheless true that the frequency of reading and writing served to increase scores on the CTBS Math and Reading test (Cohen & Intili, 1981). In other words, there was opportunity to improve basic skills for students who had low scores on reading achievement through the literacy activities in the curriculum.

Implications For Diversity

Theoretical

Expectation States Theory provides a useful basis for understanding peer interaction in classroom settings. It provides a powerful answer to the question: How do aspects of student diversity affect the processes of instructional groups? Even when interaction is momentary, as at learning centers where peers assist one another or discuss what should be done, the conditions are sufficient to activate status characteristics so that they generalize to the new tasks. The analysis supported the hypothesis that children with higher social-status are more likely to talk and work together than children of lower social-status, holding constant a measure of knowledge relevant to the curriculum in question.

Having demonstrated the operation of status characteristics in an ongoing classroom setting, we can use the methods of producing equal-status interaction that have been developed with this theory. Although there is a body of knowledge on how to modify status effects, we have yet to find effective ways to persuade teachers to use these techniques.

The linkage between interaction and learning requires theoretical development. Does the benefit arise from having the chance to give and receive explanations as Peterson and Webb have found in their research reported in this volume and elsewhere? Classroom observers did not report much abstract discussion in this study. Perhaps these children are too young for abstract discourse; or perhaps the manipulative materials allow students to help each other with simple interventions such as, "No, don't keep pushing it that way;" or "Here, look at the way I'm doing it." This setting appears to require some alternative formulation to that used by Webb and Peterson. In order to maximize learning, it will be necessary to create more powerful theories applicable to different age groups and different curricular tasks.

Practical

The use of heterogeneous peer groups in the classroom is like a two-edged sword. Talking and working together clearly has favorable effects on learning, especially conceptual learning. In this study, children who were seen as highly problematic by their teachers showed excellent learning gains. The sharpest learning gains were made by fully bilingual children and by developmentally precocious children whose pretest scores were below the state norms on CTBS. Given a strong curriculum, this model of instruction is a viable alternative to the common pattern of ability grouping criticized in Good's chapter in this volume.

However, heterogeneous groups also have distinctly negative effects. Whenever the instructional grouping is heterogeneous and the students are put into the position of using each other as resources for learning, status characteristics will become salient and relevant to the interaction. As a result, higher status students will have higher rates of participation and influence. These differences in participation and influence are often accepted as inevitable consequences of individual differences in ability. In contrast, I have argued in this chapter that they can also be seen as a product of the status structure of the classroom.

The advantage of seeing behavior partly as a consequence of status instead of a consequence of individual differences is that it frees the practitioner and researcher from having to accept the inevitable. Instead, it is possible to manipulate the social situation so as to weaken the effects of status. If status problems were weakened, we may infer that the low-status students in these classrooms would have made even better learning gains. Thus it would seem incumbent upon those of us who advocate cooperative groupwork to consider the identification and treatment of these problems of status.

References

Anthony, B., Cohen, E. G., Hanson, S. G., Intili, J. K., Mata, S., Parchment, C., Stevenson, B., & Stone, N. *The measurement of implementation: A problem of conceptualization.* Paper presented at the meeting of the American Educational Research Association, Los Angeles, April 1981.

Berger, J., Cohen, B. P., & Zelditch, M., Jr. Status characteristics and social interaction. *American Sociological Review,* 1972, *37,* 241–255.

Berger, J., Rosenholtz, S. J., & Zelditch, M., Jr. Status organizing processes. *Annual Review of Sociology,* 1980, *6,* 479–508.

Cohen, E. G. Interracial interaction disability. *Human Relations,* 1972, *37,* 648–655.

Cohen, E. G. Expectation states and interracial interaction in school settings. *Annual Review of Sociology,* 1982, *8,* 209–235.

Cohen, E. G., & Intili, J. K. *Interdependence and management in bilingual classrooms* (Final Rep. NIE: Grant # G–80–0217), Stanford, California: Stanford University, Center for Educational Research at Stanford, August, 1981.

Cohen, E. G., & Sharan, S. Modifying status relations in Israeli youth. *Journal of Cross-Cultural Psychology,* 1980, *11,* 364–384.

Cook, T. *Producing equal status interaction between Indian and white boys in British Columbia: An application of expectation training.* Unpublished doctoral dissertation, Stanford University, 1974.

Harris, A., & Lockheed, M. E. *Individual and group scientific problem-solving performance for boys and girls.* Paper presented at the meeting of the American Educational Research Association, New York, April 1982.

Humphreys, P., & Berger, J. Theoretical consequences of the status characteristic formulation. *American Journal of Sociology,* 1981, *86,* 953-983.

Rosenholtz, S. J. Treating problems of academic status. In J. Berger & M. Zelditch, Jr. (Eds.), *Studies in expectation states theory: Pure and applied.* San Francisco: Jossey Bass, in press.

Rosenholtz, S. J., & Cohen, E. G. Status in the eye of the beholder. In J. Berger & M. Zelditch, Jr. (Eds.), *Studies in expectation states theory: Pure and applied.* San Francisco: Jossey Bass, in press.

Rosenholtz, S. J., & Wilson, B. The effects of classroom structure on shared perceptions of ability. *American Educational Research Journal,* 1980, *17,* 175-182.

Stulac, J. *The self-fulfilling prophecy: Modifying the effects of academic competence in task-oriented groups.* Unpublished doctoral dissertation, Stanford University, 1975.

Zander, A., & Van Egmond, E. Relationship of intelligence and social power to the interpersonal behavior of children. *Journal of Educational Psychology,* 1958, *49,* 257-268.

CHAPTER 11

The Development of Attention Norms in Ability Groups*

DONNA EDER AND DIANE FELMLEE

An impressive body of evidence is beginning to accumulate showing that students' instructional group assignments have important consequences for their behavior. In contrast, relatively little is known about the *processes* by which grouping affects students. Information is especially needed concerning the ways in which the common practice of within-classroom ability-grouping influences elementary students' behavior.

This chapter examines one basic process by which within-classroom grouping affects students' attentiveness—the development of different attention norms. We show that assignment to a low-ability group greatly increases the likelihood that students will become inattentive during group lessons. We then do a qualitative analysis of classroom transcripts to examine the processes that produce the group effect. This involves an examination of the ways in which group members and the teacher establish norms governing inattentive behavior, norms that differ depending on the ability-group level.

Background

Much of the research on instructional grouping has been at the high-school level where curriculum track placement has been found to affect students' educational plans and/or academic achievement (Alexander, Cook, & McDill, 1978; Alexander & McDill, 1976; Hauser, Sewell, & Alwin, 1976; Rosenbaum, 1976). These studies have also

---

*Paper originally prepared for a conference on "Student Diversity and the Organization, Processes, and Use of Instructional Groups in the Classroom." Madison, Wisconsin, May, 1982.

This research was supported by Spencer Grants No. 44–329–01 and No. 44–329–03.

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.

ISBN 0-12-552220-7

identified one important intervening process, that is, students in college tracks are more likely to associate with high status, high ability, and college-oriented peers who, in turn, influence their own educational aspirations. In addition, Rosenbaum (1976) found that students who moved from college tracks to noncollege tracks adopted the attitudes and behaviors of their peer group, losing interest in school and withdrawing from school activities. Thus, at the high-school level, there is considerable evidence that students are socialized by other students in their track.

At the elementary level, ability-group assignment has also been found to affect academic achievement, controlling for initial achievement (Douglas, 1964; Weinstein, 1976). Several studies have also found dramatic differences in students' behavior across groups. Specifically, students in lower groups have been found to spend much less time attending to the task of reading than students in higher groups (Eder, 1981; McDermott & Aron, 1978). Even when controlling for individual characteristics such as reading aptitude, maturity level, sex, and social background, students in low groups were found to become inattentive at higher rates than students in high groups (Felmlee & Eder, 1983).

The influence of group environment on students' social behavior could have important implications for their academic careers. Several studies have found that students' conduct has a considerable influence on teachers' evaluations of academic performance (Entwisle & Hayduck, 1981; Williams, 1976). In fact, Entwisle and Hayduck found that the most important predictor of students' reading and math grades was their conduct mark. Normative behavior has also been found to influence instructional group assignments throughout elementary, junior high, and high school (Haller & Davis, 1981; Leiter, 1974; Metz, 1978; Rosenbaum, 1976). Thus students who are more inattentive one year may be assigned to lower ability-groups or to noncollege tracks in later years even though their greater inattention is partly due to their initial group assignment.

The first goal of this chapter is to examine the extent to which ability group level influences rates of becoming inattentive, controlling for the teacher's behavior as well as for individual and reading variables. We use a multivariate, discrete-state, continuous-time, stochastic model for this analysis. This model allows us not only to adequately examine the effect of group level on the dynamic process of becoming inattentive, but also to control for other factors that might influence rates of becoming inattentive.

The second goal of this chapter is to examine the processes by which this effect occurs. One process by which grouping might influence behavior is through the development of different norms. In general, there is evidence that groups develop norms or shared expectations regarding what is the appropriate focus and level of attention. Through their verbal and nonverbal behavior, group members define what they consider to be the focus of attention at any point in time (Goffman, 1963; Scheflen, 1973). When some members are spontaneously involved in a task, they support the reality of a particular event and increase the involvement of other group members. In contrast, when members are not attending to the common task, they challenge the reality of that event and lead others to become inattentive (Goffman, 1963).

In classrooms, all students are ideally expected to attend to classroom lessons. There is, however, some research that suggests that different classroom groups have different attention norms. McDermott, Gospodinoff, and Aron (1978) found that different levels of attentiveness developed in the high as compared to the low reading-groups, in part, because students monitored the nonverbal behavior of other students for an interpretation of what was going on. For example, if some high-group members were looking at their books, it indicated to other members that the activity of reading was taking place. On the other hand, because low-group members spent less time looking at their books, they did not help maintain a shared focus of attention on the reading task.

The teacher is also likely to play an important role in defining group norms. At the junior-high level, Metz (1978) found that teachers have different expectations regarding attentive behavior in high versus low tracks. In the high track, students were expected to pay close attention at all times. Any inattentive behavior, even whispering or daydreaming, was discouraged as soon as it was noticed. In contrast, some inattentive behavior was tolerated in the lower tracks as long as it was not too prolonged or disruptive. In short, different levels of attentiveness were viewed as appropriate in high versus low tracks.

In the second half of this chapter we examine the processes by which ability grouping influences student inattention. This involves a qualitative analysis of transcripts of verbal and nonverbal behaviors during group lessons. Through a detailed examination of sequences of group interaction we can begin to understand the ways in which other group members and the teacher influence a student's behavior. By combining qualitative and quantitative analyses we are able to clearly demonstrate the strong effect of group assignment on students' normative behavior and we also begin to explain how this group effect occurs.

Methods

Description of Classroom and Ability Groups

The classroom that was studied was a first grade classroom with 23 students. Students were assigned to ability groups during the first week of school. These assignments were based mainly on kindergarten teacher perceptions of reading aptitude, although the teacher also relied on personal observation of the students. Initially, the high, medium-high, and medium-low groups each had 6 members while the low group had 4. Later the high group was increased to 7 members, and 1 student moved from the school, leaving 3 members in the low group.

These groups met each day for 15–20 minutes of reading instruction. The primary activity for these lessons was individual oral reading during which the teacher assigned turns at reading to one student at a time until all students had at least one chance to read. This was found to be the main activity of most ability-based reading groups (Austin & Morrison, 1963).

Data Collection and Preparation

The first analysis examines the extent to which group assignment affects attentiveness, controlling for the teacher's behavior as well as for individual characteristics. Sixteen videotaped reading lessons were coded for this analysis, four lessons from each of the four groups. Half of the lessons took place during the second month of school and half took place during the seventh month. All students had had prior experience with being videotaped and their behavior on other days when they were not taped indicated that the videotaped lessons were typical of lessons in this classroom.

The following operational definitions are used.

1. *Reading Turn*—the entire period between an assignment to begin reading and the designation of a new reading turn or initiation of a new activity by the teacher, such as silent reading or discussion of worksheets.
2. *Reading Errors*—all mistakes, pauses, and omissions made by students during a reading turn.
3. *Attentive Behavior*—looking at what is being read or taught, without engaging in contact with others that is not directly related to the material being read. All other behavior during reading turns is considered to be inattentive behavior (e.g., looking away from the group, watching other group members, playing with objects such as book markers, talking about something other than the activity of reading). Intercoder agreement based on 4 of the 16 lessons was 89%.
4. *Teacher Management*—any comment that functioned to gain the attention of students was coded as verbal management (e.g., "Are you watching?" "Don't touch him."). Use of pointing for the purpose of gaining the attention of listeners was coded as nonverbal management. Intercoder agreement was 84%.

The second analysis examines the processes by which group assignment affects attentiveness. For this analysis a complete transcription was made of verbal and nonverbal behaviors during the sixteen videotaped lessons. These transcripts were then examined for all examples of both attentive and inattentive behavior that affected other group members. In addition, transcripts from two medium-high group lessons during the third month of school were examined. They allowed us to contrast the experiences of a new group member with his experience during medium-low group lessons in the second month of school.

Quantitative Model

The first analysis focuses on attention shifts in pupils. Attention shifts represent changes in qualitative states, that is, changes from attentiveness to inattentiveness, which can occur with some probability at any point in time. The appropriate model for such a process is a multivariate, discrete-state, continuous-time, stochastic model, for which Tuma, Hannan, and Groeneveld (1979) have developed an estimation procedure. This model has several distinct advantages over other classes of models used in the behavioral and social sciences (Hannan & Tuma, 1979; Tuma, *et al.* 1979), the most important being its ability to capture dynamic causal processes.

The dependent variable is an instantaneous rate of change from one state, *j*, to another state, *k*. It is defined as follows:

$$r_{jk}(t) = \lim_{\Delta t \to 0} \frac{P_{jk}(t, t + \Delta t)}{\Delta t}, \qquad j \neq k \tag{1}$$

where P_{jk} $(t, t, + \Delta t)$ is the probability of a change from state *j* at time *t* to state *k* at time $t + \Delta t$. The specific dependent variable in this research is the rate of change from the state of attention to the state of inattention. The estimation equation is of the following form:

$$r_{jk}(t) = \exp(\alpha_{jk} X + (\beta_{jk} Yt), \tag{2}$$

where α_{jk} and β_{jk} are vectors of parameters to be estimated, and *X* and *Y* are vectors of independent variables, with *Y* accounting for time dependence. Maximum likelihood estimation is used to estimate the parameters of rate models (Tuma *et al.*, 1979). Among other advantages, using maximum likelihood estimation allows estimation of the parameters with censored events included in the analysis. This leads to estimates that are asymptomatically unbiased and that also have very good small sample properties with moderate degrees of censoring (Tuma & Hannan, 1978). Censored events are observations that are interrupted before a change in state has occured. Leaving these events out of the analysis has been shown to result in serious bias (Sørensen, 1977; Tuma & Hannan, 1978).

Hypotheses

The conceptual model consists of individual characteristics, reading variables, teacher behavior, group assignment, and time dependence. The variables are defined in Table 1 and descriptive statistics are in Table 2.

The main variable of interest is group ability-level, a dummy variable coded 1 for high reading-ability groups and 0 for low groups. It is designed to measure the general effect of group assignment and is expected to have a negative effect on rates of attention

TABLE 1
Independent Variables and Their Indicators

Variable	Indicator
Gender	0—male; 1—female
Reading ability	Individual's total score on standardized reading readiness achievement tests taken at the end of kindergarten
Maturity level	Teacher's perception of individual's maturity: 1—immature, 2—average maturity, 3—mature, 4—very mature
Socioeconomic status (SES)	Father's occupational status as measured by Duncan's SEI Scale
Past individual inattention	Percent of time an individual has been inattentive during the class lesson prior to the shift
Group ability level	0 — low ability level reading group 1 — high ability level reading group
Reading length	Length of the reading turn during which the shift occurred
Reading errors	Average number of reading errors made during the reading turn when the shift occurred
Teacher management	Number of prior management acts divided by number of seconds into the lesson
Attention duration	Length of the attention period prior to the shift in seconds

shifts. That is, students in high-ability reading groups are expected to have lower rates of becoming inattentive than students in groups of low reading-ability.

We plan to test for group effects while controlling for individual characteristics and behaviors. Therefore, several individual-level variables are included in the model, that is, sex, maturity level, reading aptitude, socioeconomic status (SES), and past individual inattention. In past research, we found that reading aptitude is the only one of these individual variables that has a significant influence on attentiveness: specifically, the higher the reading aptitude of a student, the lower the rate of becoming inattentive during reading lessons. However, when reading-lesson- characteristic variables and group ability-level were added to the model, reading aptitude no longer had a significant effect on rates of attention shifts (Felmlee & Eder, 1983).

We also plan to control for characteristics of the reading lesson that may influence classroom inattention. Two reading-characteristic variables, reading length and reading errors, were found to significantly influence the rate of becoming inattentive. While longer reading turns increased rates of shifting to inattention, more reading errors reduced rates of attention shifts (Felmlee & Eder, 1983).

Previous research, however, has not taken into account the influence of the teacher's

TABLE 2

Descriptive Statistics for Independent Variables for the Fall and the Spring[a]

Variable	Fall	Spring
Gender	.44	.54
	(.50)	(.50)
Reading ability	225.8	216.9
	(28.47)	(30.0)
Maturity level	2.63	2.45
	(1.00)	(1.06)
Socioeconomic status (SES)	70.69	65.29
	(20.88)	(19.56)
Past individual inattention	.26	.28
	(.21)	(.20)
Group ability level	.44	.38
	(.50)	(.49)
Reading length	37.54	58.97
	(21.86)	(37.72)
Reading errors	1.31	2.56
	(1.25)	(2.48)
Teacher management	.03	.03
	(.03)	(.05)
Attention duration	14.79	18.10
	(17.57)	(17.53)
N of cases	256	301

[a] Standard deviations are in parentheses.

behavior on students' inattention. One main duty of the teacher in reading lessons is to attempt to maintain student attention. To do this, teachers use verbal and nonverbal management techniques designed to focus a student's attention on the reading assignment. If the teacher's management attempts are successful, then higher management rates should reduce rates of shifts to inattention. However, since management acts can be disruptive, drawing the attention of other members away from the lesson, management acts could produce more inattention.

The final variable, attention duration, is used to test for duration-dependence. Duration-dependence occurs when rates of change vary as a function of time in the origin state. In our previous research we found significant negative duration-dependence in the fall of the school year but not in the spring (Felmlee & Eder, 1983).

Results

The results, as shown in Table 3, indicate that ability-group level continues to have a strong significant effect on rates of becoming inattentive, although this effect does not emerge until spring. In the fall, the only independent variable that has a significant

TABLE 3

Estimates of the Determinants of Rates of Attention Shifts for Fall and Spring[a]

Variable	Fall ($N = 256$)	Spring ($N = 301$)
Constant	− 2.997***	− 4.527***
	(.982)	(.968)
Gender	− .254	− .010
	(.169)	(.159)
Reading ability	.000	.009
	(.005)	(.005)
Maturity level	− .036	− .149
	(.098)	(.078)
Socioeconomic status (SES)	.006	− .001
	(.004)	(.004)
Past individual inattention	.328	− .408
	(.368)	(.374)
Group ability level	− .503	− 1.469***
	(.283)	(.340)
Reading length	.006	.016***
	(.004)	(.004)
Reading errors	− .018	− .153***
	(.083)	(.045)
Teacher management	− 5.69	− 4.686*
	(3.63)	(1.835)
Attention duration	− .015**	.007
	(.005)	(.004)
Chi-square	35.38***	61.21***
df	10	10

[a] Standard errors are in parentheses.

*$.05 \geq p > .01$.

**$.01 \geq p > .001$.

***$p \leq .001$.

coefficient is attention duration. The effect of attention duration in the fall could reflect unmeasured heterogeneity.

In the spring the individual level variables have little effect on attention shift rates and the significant effect of attention duration disappears. The reading characteristic variables, however, have strong significant effects. While reading length has a positive effect on rates of becoming inattentive, reading errors reduce attention-shift rates. Management also has a significant effect in the model. Management acts appear to operate as they are intended to, decreasing rather than increasing the rate of becoming inattentive.

Of particular interest is the effect of ability-group level. It has a negative coefficient which is significant at the .001 level. The antilog of the coefficient is .23. This means that a unit increase in the group ability-level variable multiplies the rate of becoming inattentive for an individual by .23. In other words, in the spring, low-ability students become inattentive at more than four times the rate of students in high-ability groups, controlling for other effects.

It is interesting that the ability group effect does not become significant until the spring. This suggests that the longer students are exposed to a group environment the stronger its effect becomes. This provides further evidence that the ability-group effect is a function of the classroom environment, and not individual differences.

The preceding analysis demonstrates the large effect that ability grouping has on student inattention. Students in low-ability groups have a much higher rate of becoming inattentive than those in high groups, when controlling for teacher management as well as for individual characteristics. Nevertheless, it is still not clear how group environments produce the observed effect. One possibility is that norms are developed to govern attentive behavior in classroom groups and that these norms differ by ability level.

The next step in this chapter is to do a systematic qualitative analysis of the processes by which ability grouping influences student inattention in an elementary classroom. Two events afford the opportunity to examine the development of norms regarding inattentive behavior: *(a)* outside interruptions during a reading lesson and *(b)* a student reassigned from one ability group to another. We compare verbal and nonverbal behavior of high- and low-ability-group members in these two types of events. We also examine the teacher's behavior, as she or he may also act as a source for norm formation and maintenance.

Analysis of Outside Interruptions

Some students in the high group were highly attentive and through their comments helped to keep the attention of other members on the lesson. This was most obvious when nongroup members interrupted the group, taking the teacher's attention away from the lesson as in this example from the fifth week of school:

High Group[1]

((The students are reading in unison from a reading chart. Melinda, Aaron, and Otis are members of the high group, whereas Sara and Cynthia are not.))

---

[1] The following notations are used in this and other examples: (word) = unclear utterance or speaker; "word" = reading from books or charts; [= simultaneous speech; * = key utterance or behavior; ((word)) = background information.

	Verbal	Nonverbal
Teacher to All:	OK. Uh, where are they now?	
All:	At the park.	
Sara to T:	Cynthia's bothering me.	Sara comes over to the group.
Melinda:	I know what *that* says—"Park".	Melinda points to the chart.
	[	
T to Cynthia:	Cynthia, Cynthia. Let's not bother Sara.	
	[	
*M:	"Park. Park. Park."	
T to M:	All right, they're at the park, and uh, Melinda can read. Who is this?	The teacher points to the chart.
M:	"Bob is in the park."	Otis looks away from the group.
T to M:	Very good.	
T to Aaron:	Aaron.	
T to Otis:	Otis, are you watching?	
	[	
Aaron:	"Kim runs to"	
	[	
M to A:	Not "runs."	
T to A:	"Rides." He said "rides the"	The teacher nods her head.
A to T:	I said "runs."	
T to A:	Oh. What is it?	
A:	"Rides."	
T to A:	"Rides."	

During Sara's interruption, Melinda helps to keep the group's attention on the lesson by pointing to and reading from the chart. Consequently, all the members except Otis keep their attention on the chart and the reality of the lesson is quickly restored. Melinda continues to attend closely to what is being read and, in fact, notices an error which the teacher misses.

In contrast, many cases were identified where the inattentive behavior of a low-group member led to further inattention by other group members. Instead of keeping their attention on the lesson during interruptions from outside the group, low-group members were likely to play with their book markers or engage in some other type of inattentive behavior. In the next example, the same inattentive act is imitated by all three group members.

Low Group

((The students have read from a chart and are about to read a list of words from another chart when a student who is not a group member interrupts the lesson. Becky, Robin, and Cynthia are members of the low group.))

	Verbal	Nonverbal
( ) to T:	Teacher. We wanted to ( ).	
T to ( ):	Find the *a i* words and put them over here.	The teacher points to the student's paper with her *pointer. Becky tries to hit the student with her marker. * Robin is tapping her book marker on the floor.
T to All:	OK. Let's look here. Girls.	Becky taps Robin's forehead with her marker. The teacher points to the chart.
T to Robin:	Robin.	*Robin puts her marker on the side of her head like a feather. Becky sees her and does the same.
Cynthia:	"What—"	Cynthia also puts her marker by her head.
T to All:	Here's our new word. "Wuh."	
R:	"Why."	Becky looks at her book. Cynthia puts her marker down but
T to All:	"*Want*ed." Let's do it again.	Becky and Robin keep their markers by their heads. Becky is
All:	"Wanted."	still looking down. Becky looks
T to All:	"Wanted." Next. Becky? Watching?	up at the chart and puts her marker down.
All:	"Tell."	
T to All:	"Tell."	
All:	"Find-found."	
T to All:	"Found." . . . And . . . What's this one? When something's funny, what do you do?	
R:	"Laughed."	
T to Becky:	"Laughed." Let's do it one more time. Becky, watch.	"Laughed."
	[	
B:		Robin puts her marker down.

During the interruption from outside the group, Becky tries to hit the interrupter with her book marker and Robin taps her marker on the floor. After Becky taps Robin on the forehead, Robin puts her marker on the side of her head. This behavior is imitated by Becky and then by Cynthia. Because none of the students have helped to keep the group members' attention during the interruption, the teacher has to spend considerable effort focusing their attention back on the lesson. It is not until the teacher's last directive to Becky that the students are no longer playing with the book markers and are giving their full attention to the lesson.

These two examples provide a marked contrast, showing how students responded differently to outside interruption in the high groups as compared to the low group. They also provide information about the different attention norms of these two groups. On the one hand, some of the high-group members indicated that the lesson should be the focus of attention even during outside interruptions. Melinda, for example, used both nonverbal and verbal behaviors to maintain the group's focus on the reading chart. On the other hand, members of the low group did not maintain a shared focus of attention on the lesson during outside interruptions. Instead, interruptions are viewed as opportunities to turn their attention away from the lesson and engage in some type of playful activity such as playing with the bookmarkers. Similarly, high-group members often helped to maintain the group's attention during transitions in the lesson such as switching from reading a chart to reading a book, whereas low-group members were likely to become inattentive during such transitions. In general, low-group members did not expect there to be a continuous shared focus of attention during reading lessons.

Analysis of Group Reassignment

During the eighth week of school Zach was transferred from the medium-low group to the medium-high group. Since group lessons were videotaped twice during the 3-week period prior to this transfer and twice during the 3-week period after the transfer, it is possible to closely examine the experience of the same student in two different groups. By looking at the effect of other group members and the teacher on Zach's behavior we can determine some additional ways in which students' group assignments influence their behavior.

When Zach was in the medium-low group, he was frequently influenced by the inattentive behavior of other group members. During a lesson in the fifth week of class Zach notices and imitates Gary's inattentive acts.

Medium-Low Group

((Jeff is reading a page in the book. Gary has been playing with his book marker off and on during Jeff's turn. Eric, who is not a member of this group, has just interrupted the lesson. Gary, Zach, Sara, Jeff, Peter, and Dale are all members of the medium-low group.))

	Verbal	Nonverbal
*Gary:	Little dogs like to jump. Woop-woop. Woop-woop. [	Gary shakes his head with his marker on his forehead. Zach briefly puts his marker on his forehead and shakes his head.
Eric to T:	Teacher, I know what those dogs are.	
T to E:	I know you do.	
Jeff:	"I like little dogs."	
T to J:	Beautiful. "I like little dogs." Read the next line.	Sara looks away from the group.
*G:	"I like little dogs." Woop-woop, woop-woop.	Gary puts his marker back on his forehead. Zach looks at Gary and puts his marker on his forehead again.
T to J:	Here we go. "Li . . ." What kind of dogs?	Gary and Sara look at Zach. The teacher points to Gary's book, then to Jeff's book.
J:	"Little."	
T to J:	"Little . . ."	
Dale:	"Big . . . dogs."	
J:	"Dogs."	Zach shows his marker to Gary.
T to J:	What do they do? Now let's look at the "s" word.	The teacher points to Jeff's book, then to Gary's book.
T to G:	"Little dogs s-s-s . . ."	
All:	"Sit."	
T to All:	"Sit." All right.	
T to Sara:	Sara, on the next page.	The teacher points to Sara. Zach looks at his book.
*T to All:	Everybody get their markers under the right row of words?	Zach puts his marker on his page.
S:	This one?	
T to S:	Right. OK.	Jeff puts his arm around Peter.
T to J:	Don't touch him Jeff.	The teacher points to Jeff.
S:	"I like."	Gary looks at Jeff.
T to J:	Here we go. Jeff, get your marker under the row of words.	*Gary puts his marker on his forehead and shows Zach who laughs at him.
T to S:	What kind of dogs?	

At several points during this lesson Gary distracts Zach by making unusual sounds while playing with his book marker. Zach imitates Gary's nonverbal behaviors and continues to play with his book marker throughout Jeff's turn. While the teacher manages Gary's behavior at several points she ignores Zach's inattentive behavior. At the end of Sara's turn she gives a general directive to all students, with which Zach complies. However, Zach is soon distracted again by Gary's antics.

While Gary has the most influence on Zach's behavior in this sequence, Zach is also influenced by other members. For example, during the next reading turn Sara shakes her head from side to side. Shortly after, Zach starts to shake his head and continues to do so throughout Dale's turn.

Although Zach is inattentive during much of this lesson, the teacher seldom manages his behavior. This is partly due to the fact that other students are equally, if not more, inattentive, and the teacher cannot closely monitor the behavior of all members simultaneously. Consequently, the teacher as well as other group members contributes to Zach's high degree of inattentiveness as a medium-low group member.

In the eighth week of school, Zach was transferred to the medium-high group. Instead of distracting Zach's attention and causing him to become inattentive, other group members would occasionally comment on his behavior when he was inattentive or acting inappropriately. For example, during his second week in this group, Zach was reading aloud when the group was supposed to be reading silently.

Medium-High Group

((The students are reading a page from their books to themselves. Zach, Larry, Faye, and Nancy are all members of this group.))

	Verbal	Nonverbal
Zach:	"I like your hats—house. I . . . and I like you."	
*Larry to Z:	You're reading aloud.	
T to Faye:	Now don't turn. Right here.	The teacher turns Faye's page back.
Nancy:	I'm done.	
T to N:	( )	The teacher points to Nancy.
Z:	"I like your hat. And I like you."	
*L to Z:	Hey—you're bothering me.	
Z:	"I like hats. And I like you. Come in."	

First Larry tells Zach that he is reading aloud and then later tells him that he is bothering him. Neither remark stops Zach from reading aloud. In a lesson 2 weeks later, Larry again corrects Zach's behavior telling him to "read in you head." He also comments on Zach's inattentive behavior when he is playing with his bookmarker instead of following along in his book. In all of these cases Larry helps resocialize Zach by indicating what behaviors are viewed as inappropriate in the medium-high group. These very same behaviors were tolerated by members of the medium-low group.

The teacher also expects Zach to be more attentive now that he is a member of the medium-high group and is quick to manage any inattentive acts. For example, at one point in a lesson during Zach's second week in the medium-high group he starts to play with his bookmarker.

Medium-High Group

((Larry is reading a page in their book. Just prior to Larry's turn, the principal told the class that there would be a puppet show that afternoon. Zach, Larry, and Faye are all members of the medium-high group.))

	Verbal	Nonverbal
Larry:	"And I like . . . y-you-u. Can I . . . ."	
T to L:	"Can I" do what?	Zach folds his marker and puts it up to Faye's face while making a squeaking noise. The teacher points to Zach's book, then to Larry's book.
*T to Zach:	Are you watching?	
T to L:	"Can I" what, Larry? "Can I . . . ."	
Faye:	"Come."	
L:	"Come in."	
	[	
T to F:	Don't help him. He can figure it out.	

Zach's marker play during the lesson may be motivated by the announcement of the puppet show as he moved his folded marker while making a squeaking noise in a puppet-like manner. The teacher responded immediately to his inattentive behavior by asking if he was watching and by pointing to his book. Shortly after this episode, Zach lifted his bookmarker from the page being read and again the teacher immediately pointed to his book.

The teacher's response to Zach's inattentive behavior is dramatically different from her response to his behavior when he was a member of the medium-low group. This no doubt is due in part to the fact that because there was much less inattention in general in the medium-high group, the teacher can respond more quickly to inattentive acts when they do occur without having to be continuously managing students' behavior.

In addition, the teacher paid particularly close attention to Zach's behavior during this lesson. Not only did she catch inattentive acts shortly after they occurred, as shown in the previous examples, but she also kept his attention on the lesson by turning pages in his book at several points when his attention had not yet wandered. It is likely that she was focusing her attention on Zach precisely because he was a new member to this group.

During the previous year the teacher acted in a similar fashion toward Jack after he was moved from a medium-low to a medium-high group. When Jack was being disruptive the teacher told him to stop, adding that she had never had trouble with this group before. In this case, the teacher explicitly informed Jack that behavior that had been allowed in his other group would not be allowed in this group.

These examples from the medium-low and medium-high groups show that Zach had entirely different experiences in the two groups. While in the medium-low group, his attention was often drawn to the inattentive behaviors of other members, which he frequently imitated. In contrast, medium-high group members corrected his behavior when it was inappropriate and the teacher quickly managed his behavior when he became inattentive. In the process, Zach learned that he was expected to behave differently in the medium-high group and eventually became a more attentive group member.

The change in Zach's level of attentiveness is dramatically shown in Table 4. When Zach was in the medium-low group he was inattentive 43% of the time during other students' reading turns. However, when he was moved to a high reading-group he was inattentive only 18% of the time. Although his level of attentiveness in the fall was similar to that of other low-group members, his level in the spring became comparable to that of other high-group members. At the same time, students who remained in a low reading-group continue to have high levels of inattentiveness in the spring. These results, combined with the analyses of group interaction, demonstrate the strong impact of group environment on student behavior.

Discussion

In summary, students assigned to low-ability groups were more likely to become inattentive than were students assigned to high groups, controlling for teacher management as well as for individual characteristics. In the spring of the year, low-group members became inattentive at more than four times the rate of high-group members. The fact that the effect of ability-group level is much stronger in the spring further indicates that the group difference in attentiveness is due to differences in group environments rather than to individual differences.

These results also indicate that teachers are unable to offset the negative effect of low-group assignment by increasing the amount of management in those groups. Even though the teacher uses more management in low groups and management reduces inattention, students are still more likely to become inattentive if they are assigned to a low group than if they are assigned to a high group.

TABLE 4

Comparison of Attentiveness of High- and Low-Group Members with the Attentiveness of the Student Who Changed Groups

	Percent of Listening Time Spent Not Attending[a]	
	Fall (prior to move)	Spring (after move)
Mean for high groups	23.83%	19.56%
Mean for low groups	46.41%	35.87%
Zach[b]	43.32%	18.13%

[a] Computed by dividing the number of seconds when the student was inattentive by the number of seconds during which other students read aloud. (Based on two lessons in the fall and two lessons in the spring.)

[b] Zach was in a low group in the fall and in a high group in the spring.

At the same time, the qualitative analyses indicate that the teacher's use of management and underlying expectations for attentiveness *did* vary across group levels. In the high groups, the teacher was quick to manage any type of inattention as soon as it was noticed. Also, her tone of voice and her explicit comments indicated that she expected a high level of attentiveness in the high groups. When describing these groups in an interview she referred to them as her good groups. In comparison, many inattentive acts in the low groups were ignored by the teacher. Instead, management acts were aimed primarily at more disruptive behavior and prolonged inattention. Thus, while management in general tends to reduce inattention, the differential use of management in high versus low groups may be one explanation for the higher rate of becoming inattentive in lower groups.

The qualitative analyses also suggest that students are aware of and help to maintain different attention norms in high- versus low-ability groups. On the one hand, high-group members would occasionally comment on the inattentive and inappropriate behavior of other students. Also, through their verbal and nonverbal behaviors high group members continually indicated what they considered to be the focus of attention and helped to keep attention on the lesson even during outside interruptions. On the other hand, low-group members often engaged in inattentive acts that distracted other students during the activity of reading as well as during outside interruptions. Consequently, it took the teacher longer to regain the group's attention after outside interruptions in the low groups. These processes had dramatic effects on the attentive behavior of Zach who became much more attentive when assigned to a high group.

These different attention norms and resulting differences in levels of attention have a number of important consequences for students. To begin with, they affect the way that classroom lessons are conducted. Teachers are less likely to rely on discussions in lower groups because they are easily disrupted. In this classroom, the teacher had more discussions in the high group whereas she relied primarily on structured activities in the lower group (Eder, 1982). Likewise, junior-high-school teachers relied mainly on discussions in high tracks and on individual seat work in low tracks (Metz, 1978).

Consequently, students are exposed to very different instructional techniques depending on their group assignment, and have fewer opportunities to develop important communicative skills if assigned to lower ability groups or tracks.

Differences in levels of attentiveness could also have direct implications for learning academic skills. There is some evidence that students learn less when they are inattentive (Lahaderne, 1967). Also, the higher degree of management required to maintain attention in low-ability groups takes time away from academic instruction and disrupts reading turns so that it is often harder to learn to read in low-ability groups than in high groups (Eder, 1981). Consequently, students most in need of a positive learning environment are being taught under much less favorable conditions than are bright, motivated students.

Finally, as mentioned earlier, differences in attentiveness are likely to have a direct influence on students' academic careers. Because teachers form perceptions of students' academic capabilities and achievements on the basis of their normative as well as academic behavior, students who are more inattentive because of their assignment to a lower ability group are likely to be perceived as less able academically and given lower grades (Entwisle & Hayduck, 1981; Williams, 1976). They are also more likely to be assigned to lower ability groups or tracks in future years (Haller & Davis, 1981; Leiter, 1974; Metz, 1978; Rosenbaum, 1976). This is, thus, another method by which ability-group assignments can become self-fulfilling prophecies.

It is important to keep in mind that these findings are based on analyses of lessons from one first-grade classroom. More research is needed to see if such differences occur in other elementary classrooms. Other studies, however, have found similar differences in attentiveness as well as in similar group processes at both the elementary and junior high level (McDermott, *et al.*, 1978; Metz, 1978). This strongly suggests that these findings are not unique to this classroom and do warrant further investigation.

The findings of this study also indicate the need for further research on the unintended effects of ability grouping. Up until recently, most of the research on ability grouping has focused on whether or not grouping had the intended desirable effect on academic achievement. However, instructional grouping may have a variety of effects on students, many of which are unintended. In addition to influencing social behaviors such as attentiveness, grouping may affect students' attitudes, interests, communication skills, and friendship patterns (Stodolsky, Chapter 7 this volume). Since these outcomes of grouping may also have important consequences for students, more research is needed to assess the nature and extent of these unintended outcomes.

Likewise, more research is needed to identify other *processes* by which grouping affects students. In future research, we plan to examine peer and environmental influences in more detail, by looking at the effect of different types of inattention on the attentiveness of others. It is also likely that other differential norms are developed across ability groups. For example, differences in turn-taking norms have already been identified (Eder, 1982). More research is needed to examine the development of other social and communicational norms in ability groups at the elementary, junior high, and high school levels.

In conclusion, ability-group level was found to have a strong and significant effect on student attentiveness. By doing a quantitative analysis we were able to show that this effect is due to differences in group environments rather than to differences in individual characteristics or amount of teacher management. Through qualitative analyses we were then able to show that the ability groups were characterized by very different expectations for attentiveness during classroom lessons. By using both quantitative and qualitative methods we were able to obtain a more complete understanding of the relationship between group assignments and student attentiveness. More research that combines quantitative and qualitative techniques is needed to further enhance our understanding of the effects of instructional groups on students.

Acknowledgments

We would like to thank Wai-ying Tsiu for computer assistance, Coleen McCracken and Rebecca Cooper for their help in transcribing and coding the data, and Cathy Evans for typing the manuscript.

References

Alexander, K. L., Cook, M. A., & McDill, E. L. Curriculum tracking and educational stratification: Some further evidence. *American Sociological Review*, 1978, *43*, 47–60.

Alexander, K. L., & McDill, E. L. Selection and allocation within schools: Some causes and consequences of curriculum placement. *American Sociological Review*, 1976, *41*, 963–980.

Austin, M., & Morrison, C. *The first R: The Harvard report on reading in elementary school.* New York: MacMillan, 1963.

Douglas, J. *The home and the school.* London: MacGibbon & Kee, 1964.

Eder, D. Ability grouping as a self-fulfilling prophecy: A microanalysis of teacher-student interaction. *Sociology of Education*, 1981, *54*, 151–161.

Eder, D. Differences in communication styles across ability groups. In L. Cherry Wilkinson (Ed.), *Communicating in the classroom.* New York: Academic Press, 1982.

Entwistle, D., & Hayduck, L. Academic expectations and the school attainment of young children. *Sociology of Education*, 1981, *54*, 34–50.

Felmlee, D., & Eder, D. Contextual effects in the classroom: The impact of ability groups on student attention. *Sociology of Education*,1983, *56*: 77–87.

Goffman, E. *Behavior in public places.* New York: The Free Press, 1963.

Haller, E., & Davis, S. Teacher perceptions, parental social status and grouping for reading instruction. *Sociology of Education*, 1981, *54*, 162–173.

Hannan, M. T., and Tuma, N. Brandon Methods for temporal analysis. *Annual Review of Sociology*, 1979, *5*, 303–328.

Hauser, R. M., Sewell, W. H., and Alwin, D. F. High school effects on achievement. In William H. Sewell, Robert M. Hauser, and David L. Featherman (Ed.), *Schooling and achievement in American society.* New York: Academic Press, 1976.

Lahaderne, H. *Attitudinal and intellectual correlates of attention: A study of four sixth-grade classrooms.* Paper presented at the meetings of the American Educational Research Association, New York, 1967.

Leiter, K. Ad hocing in the schools. In A. V. Cicourel (Ed.), *Language use and school performance.* New York: Academic Press, 1974.

McDermott, R. P., & Aron, J. Pirandello in the classroom. In M. Reynolds (Ed.), *Futures of education.* Reston, Virginia: Council for Exceptional Children, 1978.

McDermott, R. P., Gospodinoff, K., & Aron J. Criteria for an ethnographically adequate description of concerted activities and their contexts. *Semiotics*, 1978, *24*, 245–275.

Metz, M. *Classrooms and corridors: The crisis of authority in desegregated secondary schools.* Berkeley: University of California Press, 1978.

Rosenbaum, J. E. *Making inequality: The hidden curriculum of high school tracking.* New York: Wiley, 1976.

Scheflen, A. E. *Communicational structure: An analysis of a psychotherapy transaction.* Bloomington, Indiana: University Press, 1973.

Sørensen, A. B. Estimating rates from retrospective questions. In D. Heise (Ed.), *Sociological Methodelgy.* San Francisco: Jossey-Bass, 1977.

Tuma, N. Brandon. Rewards, resources, and rate of mobility: A nonstationary, multivariate, stochastic model. *American Sociological Review*, 1976, *41*, 338–360.

Tuma, N. Brandon, & Hannan, M. T. Approaches to the censoring problem in analysis of event histories. In Karl Schuessler (Ed.), *Sociological Methodology.* San Francisco: Jossey-Bass, 1978.

Tuma, N. Brandon, Hannan, M. T., & Groeneveld, L. T. Dynamic analysis of event histories. *American Journal of Sociology*, 1979, *84*, 820–854.

Weinstein, R. Reading group membership in first grade: Teacher behaviors and pupil experience over time. *Journal of Educational Psychology*, 1976, *68*, 103–116.

Williams, T. Teacher prophecies and the inheritance of inequality. *Sociology of Education*, 1976, *49*, 223–236.

CHAPTER 12

Vygotskian Perspectives on Discussion Processes in Small-Group Reading-Lessons

KATHRYN HU-PEI AU AND
ALICE J. KAWAKAMI

Introduction

This study is a preliminary attempt to apply some of Vygotsky's (1962, 1978) ideas about speech and thought to the analysis of classroom lessons. Our aim is to show ways in which the teacher's role in leading discussions helps students to develop academic skills. In particular, we focus on ways in which teachers seek to improve children's reading comprehension skills in small-group lessons. In keeping with the purposes of this volume, we examine interactional *processes* occurring in lessons given to instructional groups: in this case, formed on the basis of students' reading achievement.

This study is one in a series of analyses of videotaped reading lessons, taught to children in the reading program developed at the Kamehameha Early Education Program (KEEP), in Honolulu, Hawaii. The reading program developed by KEEP has been described as an example of a successful reading program for disadvantaged minority students (Au, Tharp, Crowell, Jordan, Speidel, & Calkins, 1982; Calfee, Cazden, Duran, Griffin, Martus, & Willis, 1981; Speidel, Gallimore, Jordan, Dowhower-Vuyk, & Vogt, 1982). The program is designed to improve the school achievement of primary grade students of Hawaiian ancestry (the term *Hawaiian* is used to designate descendants of the original Polynesian inhabitants of the Hawaiian Islands).

Hawaiian students generally score, as a group, at about the 30th percentile on standardized tests of reading achievement, and their achievement declines as they advance through the grades (Thompson & Hannahs, 1979). Groups of Hawaiian students in the KEEP reading program, however, attain reading-test scores at or near the 50th percentile (Tharp, 1982).

The KEEP reading program has many specific features (for a detailed description

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.

ISBN 0-12-552220-7

of the program, see Au *et al.*, 1982; Tharp, 1982), but one of its most important elements is undoubtedly its small-group reading lessons. The overall purpose in the analyses of videotapes of these reading lessons has been to arrive at an understanding of why they appear to be so effective in promoting Hawaiian children's reading achievement.

One perspective taken in analyzing these reading lessons has centered on cultural congruence in the patterning of teacher–pupil interaction (Au, 1980; Au & Jordan, 1981). Patterns of teacher–pupil interaction were analyzed according to the participation structures present. Participation structures are differentiated by the nature of the rules governing speaking, listening, and turn-taking at different times in the event (Shultz, Erickson, & Florio, in press). It was found that the participation structures in KEEP reading lessons resembled those in talk-story, an important nonschool speech event in Hawaiian culture. Both the reading lesson and talk-story were characterized by joint performance, or by the cooperative production of responses by two or more children (for analyses of talk-story, see Watson, 1975; Watson-Gegeo & Boggs, 1977). These lessons seemed to encourage learning to read by allowing the children to engage in text discussion in participation structures compatible with those experienced outside the classroom (Au, 1980). The probable positive effects of talk-story-like participation structures on student learning were analyzed by Au and Mason (1981). In a micro-analysis of sample lessons, they found lessons incorporating talk-story-like participation-structures to be associated with higher rates of academically productive student-behavior than lessons without such structures. Furthermore, within lessons with talk-story-like participation structures, there were higher rates of academically productive behavior during times when interaction was judged to be more talk-story-like, than when it was judged to be less so (for example, when the teacher called on the children to speak one at a time).

Vygotsky

Although the work of Vygotsky did not influence the development of the KEEP reading program, his ideas offer another potentially valuable perspective for understanding the instructional processes involved in the reading lessons. The Vygotskian perspective on the entire KEEP educational system is being developed (Gallimore & Tharp, 1982; Tharp & Gallimore, 1982). The present study is one of three particular inquiries in this area. Speidel and Dowhower-Vuyk (1981) and Dowhower-Vuyk and Speidel (1982), for instance, have looked at language-learning–language-teaching from this perspective.

Recent studies within Vygotsky's theoretical framework point to the importance of examining the characteristics and patterning of interactions between children and their teachers. For example, Zukow (1981) sought to clarify the role of the caregiver in the emergence of play activities during the later part of a child's first year. She analyzed play sequences between six dyads, each consisting of a child and his or her caregiver. She found that children's performance in interactive sequences exceeded their performance in noninteractive sequences. Her findings indicate that social interactions with a caregiver may well play a major role in children's cognitive development.

Wertsch (1979) studied the development of self-regulative capacities by examining the interactions between each mother and her preschool child. Mothers were instructed to help their children reassemble a puzzle that had been shown to them intact. From an analysis of these interactions, Wertsch proposed four levels of interaction in a child's progress in acquiring communicative and regulative responsibilities during social interaction. The first level is characterized by the fact that the child's understanding of the task is so limited that the communication between child and mother is very difficult. The child does not recognize the possibility for other regulation within the task situation. At the second level, the child begins to make the connection between more of the mother's speech and the task at hand. During the third level, the child understands that the mother's utterances can serve as task directions; the child knows how to make use of other regulation for task completion. At the final level, the child has taken over responsibility for the task and has progressed to self-regulation.

The findings of Zukow and Wertsch point to the importance of analyses of the characteristics and patterning of interactions between children and their teachers. The study of classroom lessons should also show movement from other- to self-regulation, if Vygotsky's ideas are correct. In the section that follows, we describe a particular type of classroom reading-lesson, and suggest ways in which the gradual shift from other- to self-regulation may be occurring in such lessons.

The Experience–Text–Relationship Method

In most classrooms in the KEEP reading program, there are five instructional groups, each composed of four to six children. The children are homogeneously grouped to receive small-group reading-lessons on the basis of criterion-referenced tests. The teacher daily provides a 20- to 25-minute reading lesson to each of these small groups. While one group is receiving direct instruction from the teacher, the other children work on assignments independently, at a variety of learning centers set up around the room. KEEP teachers are directed to spend ⅔ of the time in small-group lessons on the teaching of comprehension, and are observed periodically to see that this guideline is being followed (for a description of the specific teaching behaviors in the comprehension category, see Au & Hao, 1978).

The teachers are trained to structure reading-comprehension lessons by using the experience–text–relationship or *ETR* method (Au, 1979). This method is thought to further the instructional goal, which is to enable students to comprehend text in ways increasingly independent of direct teacher-assistance. In *ETR* lessons the teacher models and guides the children through the process of using background knowledge to understand and interpret text. At the beginning of each lesson, during the *E* or experience phase, the teacher focuses her or his questioning on the children's personal experiences or background knowledge relevant to the topic of the text to be read (usually, a basal-reader story). Next, the teacher has the children read silently a section of the text, usually a page or two, and she or he often states specific pieces of information the children are to find (e.g., the characters and the setting). After the children have finished reading, the details of the story are discussed (*T* or text phase). Then, in the *R* or relationship phase, the teacher uses questioning to help the children draw relationships between their background knowledge and text information. *R* phases generally alternate with *T* phases, the children reading and discussing the text at a literal level, and then interpreting it in terms of their existing knowledge structures. During *R* phases the teacher may also encourage the children to speculate about what is going to happen later in the story.

In lessons given while the children are at the earliest stage in the development of their text comprehension abilities, the teacher must provide a great deal of support for their performance during all three phases of the lesson. This first stage may be depicted as follows: *E–T–R*. At the second stage the teacher may be able to decrease her support of the children's performance during the *E* phase, as they gradually are able to identify and access the background knowledge they have relevant to the topic of the story. This stage may be depicted in this way: *(E)–T–R*, with the phase in parentheses being that for which little or no teacher assistance is required. The third stage may be depicted as *(E)–(T)–R*, indicating that the children are able to comprehend details of the text with little or no teacher support. The fourth and final stage, *(E)–(T)–(R)*, is that in which the children are able to carry out all three phases of the strategy without direct teacher assistance.

From a Vygotskian perspective, one reason these lessons may be so effective in promoting students' reading achievement is that they have the effect of gradually transferring reading-comprehension skills from the interpsychological to the intrapsychological plane of functioning. Reading skills are first exercised by the children under close adult guidance, as part of an external social process. The teacher, in leading group discussions, serves as the more capable other, through skillful questioning helping the children to understand important information in the text. Although the children have been homogeneously grouped for discussion, some are bound to have somewhat less skill in text comprehension than others, and the performance of these less capable children may also be assisted by other children in the group. Gradually, the teacher diminishes the amount of support offered for performance during the three different phases of the lesson, giving the children the opportunity to assume greater and greater control over the processes of group discussion and text comprehension. What was once an external, group process then becomes an internal, individual one.

Because the ultimate goal of *ETR* lessons is to have the children internalize a general strategy for text comprehension, the teacher must assess the ability of the children as a group to apply the strategy independently, so that neither too much nor too little guidance is provided during instruction. In an *ETR* lesson taught by an experienced and successful teacher, we would expect to see the teacher frequently asking questions that the children are not able to answer easily. She or he should be tolerant of errors made by the children in their attempts to answer correctly, although only appropriate responses should be reinforced. The teacher should also provide opportunities for students to introduce their own ideas as topics for discussion, in this way allowing them to assume a portion of her or his role. The teacher should almost never be observed to provide information to the children directly if it is knowledge that they might be expected to have or if it is a conclusion that they can be led to through questioning. In other words, teacher lecturing and explaining should be minimal. But she or he should highlight for the group correct answers that incorporate information important to an overall understanding of the text, so that the children come to recognize and strive to reach competent and acceptable levels of performance.

From a Vygotskian point of view, these teaching procedures are likely to be effective in promoting learning, because the teacher-led group discussion operates in the *zone of proximal development* (Vygotsky, 1978). The zone of proximal development, in the terms more commonly used in education, is that region between the child's mastery level and instructional level, the former being that at which skills can be exercised independently, and the latter that at which skills can be applied reliably only with the assistance of more capable others.

The Present Study

In this study we analyzed a single videotaped *ETR* reading lesson, in an attempt to specify the processes of group discussion occurring when instruction appears to be operating in the zone of proximal development. We looked at the overall organization of the group discussion in order to identify the characteristic types of teacher–student interchanges, and the text and text-related ideas established. We wanted to understand how the different types of interchanges might fit together to facilitate the process of group discussion and the children's acquisition of skills in reading comprehension.

We also examined five specific research questions.

First, if instruction is in the zone of proximal development, a substantial proportion of the questions asked by the teacher should not be answered easily by the children. The children's initial responses to these questions should be incorrect, only partially correct, or incomplete.

Second, after an incorrect or incomplete response occurs, the teacher should make good use of that opportunity to encourage the children's learning. Thus, she or he should not provide the answer, but should ignore incorrect responses and wait for a correct response to be given. If a correct response does not occur, he or she should ask a follow-up question.

Third, if the teacher is indeed eliciting responses from the children, and having them "reach" for answers, teacher–student interchanges around many questions should be quite lengthy. That is, these interchanges may involve one or more follow-up questions and several sets of student responses.

Fourth, the teacher should highlight correct responses given by the children on points important to the group discussion and to the comprehension of the text. In this way feedback is given and competent performance reinforced. More importantly, perhaps, the teacher models at the same time the process of text comprehension as an ongoing activity, requiring the periodic digesting, restating, and summarizing of information. Thus, restatement, rather than a simple acknowledgment of the children's responses, should occur frequently.

Fifth, if instruction is occurring in the zone of proximal development, the children should occasionally come up with text-related ideas on their own. These ideas should not be directly cued by a teacher question. If and when such ideas are presented by the children, the teacher should be accepting of them. She or he should acknowledge, restate, or even build through questioning upon those that have the potential for furthering the group's comprehension of the text.

Methods

The Videotaped Reading Lesson: Subjects and Materials

Once analyzed, the 17-minute segment of videotape shows most of the story discussion portion of the reading lesson. The lessons were taught by the second author, a teacher of Hawaiian ancestry who has worked at the KEEP laboratory school for 4 years. She is considered to have mastered all of the skills required to conduct effective lessons in reading comprehension. At the time the lesson was given, the teacher had no knowledge of Vygotsky's theory. The lesson was part of the children's regular program of instruction, and the teacher made no special arrangements for it. We regard the lesson as typical rather than exemplary in character, and it was selected for analysis in part for this reason.

The students in the lesson were five third-graders (8-year-olds), three boys and two girls. Four of the five were of Hawaiian ancestry, while one was Hispanic, although he too had been born and raised in Hawaii. Four of the children were from disadvantaged backgrounds, and all were native speakers of Hawaiian Creole English, a nonstandard local dialect. They were in the highest of five reading groups in the class.

The story used in the lesson was "The Mayo Brothers" by Jane Goodsell, a selection in the Allyn and Bacon basal reader series (Ruddell, Spacke, & Dillon, 1978). The part of the text discussed in the lesson describes their childhood, the different physical and personal characteristics of the boys, and the close relationship that developed between the brothers and their parents. The rest of the text deals with the adult lives of the Mayo brothers and their careers in the field of medicine.

Procedures

TRANSCRIPTION AND DISCOURSE ANALYSIS

All speech in the lesson was transcribed as completely as possible. The transcript was supplemented by important nonverbal information taken from the videotape, for example, about when the teacher was writing on the board. A discourse analysis of the lesson was then conducted. Topics of discussion were identified, and the lesson was seen to be divided into sequences, to be referred to as teacher–student interchanges, centering on these topics.

CODING OF UTTERANCES

Only those utterances that could be considered part of the group discussion of text or of text-related topics were analyzed. Such utterances were defined, in the case of the teacher, as (*a*) questions about the text or text-related topics, (*b*) restatements of information in student responses, (*c*) acknowledgments of student responses (e.g., "okay," "all right"), (*d*) providing additional information beyond that requested in the question, and (*e*) giving the answer. Teacher questions included repetition of a previous question, or statements clarifying a question and inviting further student responses. Restatements were exact repetitions or rephrasings of the information given in a student response. Acknowledgments included an "okay" or "all right" after a student response, not followed by a restatement of the content of the response. Teacher statements providing additional information were those that added content not directly related to the question on the floor, but serving to amplify or extend student answers given to the question. These frequently followed a restatement. Among teacher utterances excluded from the analysis were nominations (calling on individual children to assign them a turn to speak), and management statements made during transitions into a period of silent reading.

Student utterances considered to be part of the group discussion were the following: (*a*) responses to teacher questions and (*b*) initiations stemming from text or text-related topics and not directly cued by the teacher. Student responses to teacher questions were answers given following a question on the question topic. Student responses to teacher questions were further categorized as correct or incorrect. The criteria for a correct response were that the answer had to be directly addressed to the teacher's question and could not contradict or be inconsistent with ideas in the text, even if the response concerned events outside the story (e.g., the child's own experience or extensions of text content). Initiations were student statements made on a new topic and not directly in response to a teacher question. Initiations had to occur in the juncture following a teacher restatement or acknowledgment, closing the previous interchange, and before another teacher question. Student utterances not included in the analysis were the following: bidding for the floor; yes–no answers with no further amplification; repetition of words or phrases stated by the teacher or other children; comments not about text or text-related topics; utterances in which parts of words or phrases were missing, making the content of the response unclear; and inaudible comments or those in which no words could be discerned. Reliability in coding teacher and student utterances according to this system was 92%, based on the number of agreements over the total number of utterances.

Results

Overall Structure of the Group Discussion

Group discussion was clearly organized according to the structure expected when the teacher uses the *ETR* method. The lesson opened with a series of interchanges centering on background knowledge the children had about doctors (*E* phase). Discussion topics included how doctors help you, where they get the knowledge about how to perform operations, and the different kinds of doctors. Then there was a period of silent reading. This was followed by a series of interchanges based on information in the text (*T* phase), about the characters and setting, and the differences between the brothers. An example of a teacher question was, "What did he (Charlie) look like?" In the final phase of the lesson (*R*), the discussion centered on conclusions the students were able to draw in relating ideas in the *E* and *T* phases. These interchanges centered on why those boys might make good or bad doctors and the possible role played by their parents in helping them to become good doctors. Another way of thinking about the flow of group discussion is in terms of the propositions established as outcomes of interchanges.

TEACHER–STUDENT INTERCHANGES

Within this overall structure, there were 39 teacher–student interchanges, each centering on a different text or text-related topic. The *E* phase of the lesson was composed of 11 interchanges, the *T* phase of 15, and *R* phase of 13. These interchanges differed in two ways. First, some interchanges started with a teacher question, others with a student initiation of a text or text-related topic not directly cued by a teacher question. Second, some interchanges were simple, whereas others were complex. A simple interchange included only one teacher restatement or acknowledgment. After the initial teacher-question or student statement opening the interchange, there was a set of student responses, perhaps including incorrect responses. This set of responses was followed by a single teacher restatement or acknowledgment, concluding the interchange. In contrast, complex interchanges included more than one set of student responses, and more than one teacher restatement or acknowledgment. A subset of complex interchanges included teacher questions following an incorrect student response; these interchanges are referred to as complex-incorrect. In complex-incorrect interchanges, one set of student responses contained an incorrect answer leading to a teacher question directed at its correction. Complex interchanges also concluded with a teacher restatement or acknowledgment. When these two dimensions of difference were taken into account, six categories of interchange were identified: (*a*) teacher question, simple, (*b*) teacher question, complex, (*c*) teacher question, complex-incorrect, (*d*) student initiation, simple, (*e*) student initiation, complex, and (*f*) student initiation, complex-incorrect.

As expected, by far the greater number of interchanges started with a teacher question, 35, while only 4 began with a student initiation. One question interchange was classified as incomplete, because it did not include either a teacher restatement or an acknowledgment; this interchange was not included in further analysis. There were more complex interchanges than simple ones, 23 as opposed to 15. Seven of the complex interchanges were of the complex-incorrect type. The number of interchanges in each of the six categories was as follows: teacher question, simple, 14; teacher question, complex, 14; teacher question, complex-incorrect, 6; student initiation, simple, 1; student initiation, complex, 2; and student initiation, complex-incorrect, 1.

In order to convey something of the flavor of the lesson, two transcript excerpts are presented here subsequently. The first is a typical teacher question, complex interchange, the kind most common in the lesson. The second is a student initiation, complex interchange, a more unusual kind of interchange.

This teacher question, complex interchange is the third interchange in the *R* section of the lesson. The topic of discussion was why the Mayo brothers might become good doctors. The interchange opens with the teacher asking for other ideas on this topic.[1]

T: Any ideas, Ronnie? Joey?
J: They goin' study the parts of the body ________.
T: Okay, they would have to study.
C: And they are friendly.
T: Okay, if you have a doctor who's friendly,
R: I/know (?)/
T: /would that/that help you? Why?
D: /'Cause they work with children./
S: /Yeah________/

---

[1] T is the teacher; J, C, R, D, and S, students. Overlapping speech is indicated by slashes. Question marks in parentheses indicate utterances in which the speaker's exact words could not be clearly discerned; it appears, though, that these words were used. Blanks indicate inaudible parts of utterances.

T: He could be a pediatrician and work with children because children like to go to/a doctor who's/

R: /He could be a santicist (?)/

T: friendly.

D: Scientist.

C: /Scientist./

S: /Scientist./

T: He could be a scientific doctor who looks for cures and things?

After the initial teacher question, there is more than one set of student responses and more than one teacher restatement. The first student response is made by J., who suggests that they could study parts of the body. The second set includes the idea that the brothers are friendly and might become good doctors for children. The final set of student responses suggests that the brothers could be scientists who look for cures. The teacher restates and in some cases amplifies ideas after each set of student responses.

The following example of a student initiation, complex interchange is the eighth interchange in the *E* phase of the lesson and centered on the students' background knowledge about doctors. As shown in the following, the interchange preceding this one had closed with a teacher restatement about what doctors have to learn. S. opens the new interchange.

T: They learn terms like milligrams and they/learn how to do surgery./

S: /or they can be a scientist./

R: /some time they get to/

J: /________/

R: Help.

J: Molecules (?).

T: Okay, what is an (?) - what kind of doctor are you talking about? Is that the kind of doctor who would take care of you if you have a cut or if you're sick?

J: No.

S: /Yeah/

T: /What/ kind of doctor are you talking about?

S(?): Science (?) doctor (?).

T: A scientist, okay. What does that doctor do?

After the student response, the teacher asks a question to focus on the idea that doctors can be scientists. When the proposition is established, the interchange ends. In the next interchange the group discusses the idea of a scientific doctor in more detail. Thus, the student-initiated topic was incorporated into the lesson as completely as teacher-introduced topics.

Results for the Five Research Questions

1. Incorrect or incomplete student responses The first research question had to do with the number of teacher questions that the children had difficulty answering correctly. It was expected that there should be a substantial number of interchanges opening with teacher questions that could not be readily answered. In order to test this idea, the first set of student responses in each of the question interchanges was examined. This was the set of responses given before the teacher presented a restatement, acknowledgment, or follow-up question. In 11 of the 34 question interchanges this set of responses contained one or more incorrect answers.

2. Teacher responses to incorrect answers The second research question concerned the teacher's willingness to elicit information from the students, rather than just providing the information for them, even if the students had to struggle to arrive at the correct answer. To test this idea teacher responses following incorrect student responses were examined. The teacher could wait for another student to provide a correct response, choosing to ignore the incorrect answer; ask a question or provide a cue; or tell the answer. There were 25 incorrect student responses in all. After 11 of these responses the teacher waited or ignored the response, after 13 she asked a question or gave a cue, and after only one did she tell the answer.

3. Complexity of interchanges The third research question had to do with whether the teacher was willing to engage in lengthy interactions with the children, having them "reach" for answers. This idea was tested by looking at the number of complex versus simple interchanges, assuming that complex interchanges reflected the teacher's efforts to elicit information from the children. As reported earlier, there were 23 complex interchanges and 15 simple ones.

4. Teacher highlighting of correct responses and modeling of comprehension skills The fourth research question had to do with the teacher's behaviors in reinforcing appropriate responses given by the children, in consistently modeling comprehension processes, and in focusing the group discussion. To test this idea, the teacher's behavior at the end of each interchange was examined. The teacher might restate the main points in that section of discussion or merely acknowledge students' responses (there was only one interchange in which the teacher did neither, the incomplete interchange referred to earlier). There were 30 interchanges concluding with a teacher restatement, and 8 with an acknowledgment.

5. Student initiations The fifth research question had to do with the occurrence of student initiations, introducing topics for discussion not directly cued by a teacher question. Each interchange was examined to determine whether discussion was opened by a student initiation. Four student-initiated interchanges were identified. All of these initiations served as the basis for further group discussion, although one was based on a student's misunderstanding of the text.

Discussion

Within the *ETR* structure of the lesson, six different kinds of teacher-student interchanges were identified. These were differentiated in two ways: (*a*) by the type of utterance opening them, whether a teacher question or student initiation, and (*b*) by their complexity, whether they incorporated a single set of student responses, or several. As expected, most interchanges started with a teacher question setting the topic for discussion. There were, however, also interchanges when students initiated topics for discussion. Well over half of the interchanges were complex and extended, rather than simple and short.

These interchanges, as units of interaction and negotiation, were used by the teacher to prepare the students to read, and once they had begun to read, to wend their way through the text. One way of thinking about the discussion is as a collaborative effort to establish and reach agreement about different text and text-related propositions, for example, the fact that doctors need to go to a professional school. Each of the different propositions established may be regarded as a kind of group product, an outcome often reached only through extended teacher–student negotiation.

When the results of the different analyses are considered together, process–product distinctions become blurred. It is difficult, if not impossible, to distinguish teaching behaviors directed at developing comprehension skills from those aimed at assessing understanding of the text at hand or establishing propositions. An obvious reason for the fuzziness of the process–product distinction is that instruction aimed at the overall development of reading comprehension skills must take place using some text as its raw material. Even though the text may be seen merely as a vehicle for comprehension instruction, and long-term retention of text information is not a goal, ideas in the text are still the topics of discussion. Thus, propositions established in lessons should not only be viewed as ends in themselves, but as indicators of successfully negotiated, and often academically productive, interchanges.

As evident in the analyses, much of the lesson consisted of teacher question, complex interchanges. These typically opened with a teacher question, followed by a set of student responses, then a teacher restatement or acknowledgment, then another set of student responses, and closed with a teacher restatement. Some of these interchanges were longer, including more than two different sets of student responses.

The results of analyses conducted to examine five research questions, centering on the possible relevance of some of Vygotsky's ideas to the lesson, provide more detailed information about the dynamics of the group discussion. All of the questions were answered affirmatively. First, it was found that many of the questions posed by the teacher at the start of an interchange elicited one or more incorrect responses. This finding seems to indicate that the teacher was generally conducting the discussion at the children's instructional level, or in Vygotsky's terms, that the questions were intended to call for the use of skills in the zone of proximal development. Of course, not all of the questions elicited incorrect responses, and these more easily answered questions seemed to play an equally important role in the lesson. Because these questions occurred as well, the children did not constantly have to struggle to respond correctly. The presence of some easier questions was probably required to keep the children answering and participating actively, and to prevent them from becoming frustrated and discouraged.

Results for the second research question verified that the teacher would almost always try to elicit answers from the students, rather than telling them the information. Thus, when incorrect responses were made, the teacher either waited for a correct answer to be given or asked a follow-up question. The giving of incorrect responses was not punished. In this situation it seems likely that the children will try to frame answers even when unsure of exactly what the right answer is. They have many opportunities to practice comprehension skills not yet mastered, without fear of embarrassment. From the teacher's point of view, the occurrence of incorrect responses provides valuable information. When such responses occur, the teacher can identify children who have not succeeded in processing text and discussion information well. Often the teacher learns exactly which points have been misunderstood and so knows which questions to ask next.

A third finding, already alluded to, was that there were many more complex than simple interchanges. Complex interchanges allowed the teacher to support the children's comprehension performance. She was able to do this by restating appropriate responses, sometimes adding more information, and by asking follow-up questions. In simple interchanges, on the other hand, the teacher often provided immediate feedback for correct responses. From her point of view, these interchanges generally served as checks on whether the children were processing text or discussion information correctly, as well as opportunities to establish propositions easily understood but nevertheless important to the discussion. It is unlikely that much learning took place in simple interchanges, although they did provide the occasion for successful practice.

A fourth idea confirmed was that the teacher almost always concluded interchanges by restating important points brought out in the immediately preceding discussion. In these periodic restatements the teacher marked for the students the significant information a mature reader might also note mentally, thus making visible parts of normally invisible thought processes. (Presumably, with older, more skillful readers, the teacher should encourage the *children* to formulate these restatements.) Interchanges seldom concluded with mere acknowledgments of the children's responses. Acknowledgments might be expected to provide too little support for continued good performance, especially if the text is somewhat difficult.

A fifth idea confirmed was that the students would occasionally initiate topics for discussion. These initiations were built upon by the teacher, and the resulting discussion interchanges fit into the lesson in much the same way as those opened by teacher questions, both being used also to establish propositions. These two features, student initiations and their use by the teacher in the discussion, are both in keeping with Vygotsky's ideas about how learning takes place. In making these initiations, students assume the teacher's role in the lesson, introducing the next topic for discussion. The teacher, as the more capable other, encourages learning by allowing, and perhaps encouraging, the children to take control in this area.

Conclusions

Other studies exploring Vygotsky's concepts, like those by Zukow (1981) and Wertsch (1979), examined interactions between an adult and a single child. The lesson analyzed here showed much more complicated patterns of interaction, because the teacher worked with a group of five children. It was found, though, that the teaching and learning process appeared in many ways to follow along similar lines, also consistent with Vygotsky's ideas.

In analyzing this sample lesson from a Vygotskian perspective, we gained a better understanding of why lessons like this, in which reading comprehension instruction takes place, seem to be so effective in improving the school achievement of young, disadvantaged Hawaiian students. Instruction seemed to occur in the zone of proximal development, and the teacher worked collaboratively with the children in the group discussion to support the development of their text comprehension skills. Details of the teaching and learning process, aspects of other-regulation and the beginnings of self-regulation, were examined. By using the *ETR* method, the teacher sought to encourage the transfer of reading comprehension skills from the interpsychological to the intrapsychological plane. The teacher accomplished this by eliciting and then supporting student responses to text and text-related questions. Also, students were allowed to initiate topics of discussion and so to take momentarily the role of the more capable other. They could become more competent in at least part of the teacher's role, and demonstrate at the same time the acquisition of new skills.

With reference to previous research on similar lessons, the findings of this study provide more information about how the presence in a lesson of certain patterns of teacher–pupil interaction may further learning. As mentioned earlier, this lesson, and others taught in the same program, are based on talk-story-like participation structures, characterized by student control of turn-taking and joint performance, or the collaborative production of responses. Although it has been argued that such participation structures promote learning to read because they are culturally compatible, the results of this study underscore the importance of another line of argument, having to do with the many opportunities for students to respond (Au & Mason, 1981), and with the nonpunitive nature of the teacher's reactions to incorrect answers. The findings that the organization of these lessons is in both talk-story-like participation structures and complex interchanges are entirely consistent with one another (it should be noted, though, that the structures and interchanges do not map directly onto one another or always have the same boundaries). Both findings indicate that the teacher rarely singles out one child to answer a given question, but almost always allows more than one, or any who think they know the answer, to speak. Both highlight the fact that the teacher must then work hard to keep the discussion on track, largely through restatement and further questioning, because of the amount of student talk. The results of this study also reinforce earlier suggestions that the teacher and children work in especially close cooperation in lessons like this.

Still, many questions remain to be answered about how lessons like the ones examined here may promote the development of reading comprehension skills. For example, we need to know whether, as Wertsch's (1979) findings would imply, children participate in reading-lesson interaction at different levels in the transition to self-regulation. It seems likely that they do, as we hypothesized in our earlier discussion of the *ETR* method, and if this is the case, we need to be able to follow children's progress through these levels, and perhaps develop training sequences appropriate for children at different stages of competence.

In addition to opening up new avenues for research, Vygotsky's ideas may give us ways of better understanding findings from certain existing groups of studies. Studies of the relationship between levels of teacher questioning and student achievement, such as those included in the meta-analysis conducted by Redfield and Rousseau (1981), are one example. The results of this meta-analysis point to gains in student achievement when a greater number of high cognitive level teacher questions are asked. Results of the present study suggest reasons why such questions may exert a positive influence on student learning. Perhaps teachers who ask higher cognitive questions learn how to capitalize on incorrect student responses, by focusing on the development of comprehension skills in the zone of proximal development. These teachers may be those who engage in sustained interchanges with students, concentrating on clarifying their understanding of particular ideas.

Typically, teacher questions are coded individually in these studies, according to category systems differentiating higher- from lower-order questions. Yet, as we have seen here, the instructional value of different types of teacher questions may more accurately be judged in the context of the entire instructional event. The significance of identically worded teacher questions may differ, depending on the kind of interchange in which each occurs, and the role of that kind of interchange in the lesson as a whole. Thus, analytic methods now widely in use may need to be supplemented by more holistic ones if the intent is to examine the dynamics of instruction.

Vygotsky's ideas, and the methods used in analyzing the sample lesson, seem to offer a good starting point for the development of more complex yet coherent models of small-group instruction. The area of reading comprehension instruction is one where such models are sorely needed. Despite the accumulation of research findings on reading comprehension (see, for example, papers in the volume edited by Spiro, Bruce, & Brewer, 1980), teachers often find that studies fail to provide them with information about how to provide effective comprehension instruction. Many teachers who wish to give comprehension lessons probably lack a good understanding of how to go about doing so. In fact, the results of Durkin's (1978–1979) study lead to the conclusion that very little reading comprehension instruction of any kind routinely occurs in most elementary school classrooms. Durkin distinguished teacher question-asking aimed at instruction from that aimed at assessment. With the former, the teacher uses questions and answers to advance comprehension abilities, whereas with the latter, she or he does nothing with children's answers aside from indicating that they are right or wrong. Durkin acknowledged that differences between the two types of question-asking were difficult to spell out, but found the definitions proposed adequate for the purposes of classroom observation. This was the case because so few instances of comprehension instruction were found—only six question–answer sessions out of all those observed during her extensive study.

In contrast, much of the question-asking behavior of the teacher in our sample lesson would qualify as comprehension instruction under Durkin's definition. Teacher-question, complex interchanges clearly fall in this category, because the teacher did not merely provide feedback about the correctness of student responses or tell the answers, but helped the children arrive at the correct answers through further questioning. It is not clear, from Durkin's definitions, whether teacher-question, simple interchanges would be considered instruction or assessment. In these interchanges, the teacher did not help the children work out the meaning of a specific part of the text, because they apparently understood the material covered by the question. On the other hand, as we suggested earlier, both simple and complex interchanges may be required for learning to take place in group discussion. Thus, we need to study relationships among different comprehension teaching acts, such as those Durkin termed instruction, assessment, and application, in the context of exemplary lessons given to children at different levels of reading skill, for different instructional purposes.

Further analyses within a Vygotskian perspective have the potential for leading us to more specific definitions of comprehension instruction. Beyond this, Vygotsky's ideas may promote the development of complex models of effective small group instruction, not only for reading comprehension but also for other academic areas, which will be theoretically sound while still offering practical guidelines for classroom teaching.

References

Au, K. H., & Hao, R. *A quality control system for reading instruction* (Working Paper). Honolulu: Kamehameha Early Education Program, 1978.

Au, K. H. Using the experience-text-relationship method with minority children. *Reading Teacher*, 1979, *32*, 677–679.

Au, K. H. Participation structures in a reading lesson with Hawaiian children: Analysis of a culturally appropriate instructional event. *Anthropology and Education Quarterly*, 1980, *11*(2), 91–115.

Au, K. H., & Jordan, C. Teaching reading to Hawaiian children: Finding a culturally appropriate solution. In H. T. Trueba, G. P. Guthie, & K. H. Au (Eds.), *Culture and the bilingual classroom: Studies in Classroom Ethnography.* Rowley, Massachusetts Newbury House, 1981.

Au, K. H., & Mason, J. M. Social organizational factors in learning to read: The balance of rights hypothesis. *Reading Research Quarterly*, 1981, *17*(1), 115–152.

Au, K. H., Tharp, R. G., Crowell, D. C., Jordan, C., Speidel, G. E., & Calkins, R. *KEEP: The critical role of research in the development of a successful reading program*. Paper prepared for an edited volume based on presentations at the Wingspread Reading Conference, Racine, Wisconsin, March 1982.

Calfee, R. C., Carden, C. B., Duran, R. P., Griffin, M. P., Martus, M., & Willis, H. D. *Designing reading instruction for cultural minorities: The case of the Kamehameha Early Education Program*. New York: Ford Foundation, Division of Education and Research, December 1981.

Dowhower-Vuyk, S., & Speidel, G. E. *Oral language in a successful reading program for Hawaiian children* (Tech. Rep. No. 105). The process of language learning. Honolulu: Kamahameha Early Education Program, 1982.

Durkin, D. What classroom observations reveal about reading comprehension instruction. *Reading Research Quarterly*, 1978–1979, *14*(4), 481–533.

Gallimore, R., & Tharp, R. G. *The regulatory functions of interactive teaching: A microethnographic analysis of reading comprehension lessons*. Unpublished manuscript, The Kamehameha Early Education Program, Honolulu, 1982.

Redfield, D. L., & Rousseau, E. W. A meta-analysis of experimental research on teacher questioning behavior. *Review of Education Research*, 1981, *51*(2), 237–245.

Ruddell, R. B., Spacke, E. B., & Dillon, B. A. *Handbook*. Boston: Allyn & Bacon, 1978.

Speidel, G. E., & Dowhower-Vuyk, S. *Developing children's discourse skills* (Tech. Rep. No. 104). Honolulu: Kamehameha Early Education Program, 1981.

Speidel, G. E., Gallimore, R., Jordan, C., Dowhower-Vuyk, S., & Vogt, L. *Oral language in a successful reading program for Hawaiian children* (Tech. Rep. No. 105). Honolulu: Kamehameha Early Education Program, 1982.

Shultz, J., Erickson, F., & Florio, S. Where's the floor? Aspects of the cultural organization of social relationships at home and at school. In P. Gilmore & A. Glatthorn (Eds.), *Ethnography and education: Children in and out of school.* Washington, D.C.: Center for Applied Linguistics, in press.

Spiro, R. J., Bruce, B. C., & Brewer, W. F. (Ed.). *Theoretical issues in reading comprehension: Perspectives from cognitive psychology, linguistics, artificial intelligence, and education*. Hillsdale, New Jersey: Erlbaum, 1980.

Tharp, R. G. The effective instruction of comprehension: Results and description of the Kamehameha Early Education Program. *Reading Research Quarterly*, 1982, *17*(4), 503–527.

Tharp, R. G., & Gallimore, R. *Regulation theory*. Manuscript in preparation, 1982.

Thompson, M., & Hannahs, N. *Testimony prepared for the Native Hawaiian Education Act*. Paper presented at a joint committee on elementary, secondary, and vocational education and post-secondary education for the United States House of Representatives, Honolulu: Kamehameha Schools, November 1979.

Vygotsky, L. S. *Thought and language*. MIT Press: Cambridge, 1962.

Vygotsky, L. S. In M. Cole, V. Hohn-Steiner, S. Scribner, & E. Souberman (Eds.), *Mind in society: The development of higher psychological processes*. Cambridge, Massachusetts: Harvard University Press, 1978.

Watson, K. A. Transferable communicative routines: Strategies and group identity in two speech events. *Language in Society*, 1975, *4*, 53–72.

Watson-Gegeo, K. A., & Boggs, S. T. From verbal play to talk story: The role of routine in speech events among Hawaiian children. In S. Ervin-Tripp & C. Mitchell-Kernan (Eds.), *Child discourse*. New York: Academic Press, 1977.

Wertsch, J. V. From social interaction to higher psychological processes: A clarification and application of Vygotsky's theory. *Human Development*, 1979, *22*, 1–22.

Zukow, P. G. Words on play: A micronanalytic study of the role of the caregiver in the emergence of play activities during the one-word period. *The Quarterly Newsletter of the Laboratory of Comparative Human Cognition*, October, 1981, *3*(4), 68–71.

IV

Conclusion

CHAPTER 13

Summary and Implications*

MAUREEN HALLINAN

Overview

A primary aim of public schooling in the United States is to provide opportunities for all students to develop their maximum potential as individuals and members of society. Related to this aim is the sometimes contradictory goal of equality of educational opportunity—that is, that all students be given the same or equal opportunities for educational attainment. The problem of grouping students for instructional purposes, when seen in relationship to these goals, is one of considerable significance for educational researchers and practitioners. The efficacy of grouping students for instruction must be debated and evaluated in relationship to these fundamental aims of education.

Instructional grouping, in the form of tracking and within-class grouping, are common practices in United States schools. Despite their prevalence, however, research on grouping remains somewhat limited. Tracking has attracted some research attention partly due to its obvious implications for college entrance and career opportunities. Within-class instructional grouping has received less study. The chapters in this volume, coming from three different research traditions, review, organize and integrate some of the previous research on this topic, reconceptualize the grouping process and report new empirical studies in this area.

These chapters contribute significantly to the literature in three ways. First, they provide the basis for some generalizations about the effects of grouping practices on student learning and development and yield new insights into the mechanisms that link student and classroom characteristics to student outcomes. Second, they suggest some

---

*The research reported in this paper was funded by the Wisconsin Center for Education Research which is supported in part by a grant from the National Institute of Education (Grant No. NIE-G-81-0009). The opinions expressed in this paper do not necessarily reflect the position, policy, or endorsement of the National Institute of Education.

Copyright © 1984 by the Board of Regents
of the University of Wisconsin System.
All rights of reproduction in any form reserved.
ISBN 0-12-553220-7

implications of the current state of research on instructional grouping for future research. Third, they suggest some implications for educational policy. These three contributions are elaborated in the remainder of this chapter.

Generalizations about the Effects of Instructional Grouping

The chapters in this volume provide an overview of the current state of knowledge on the effects of grouping for instructional purposes. They permit us to make some generalizations about the process of assigning students to groups and about the effects of instructional grouping on growth in academic achievement. The multidisciplinary approach of the volume has the advantages of allowing us to corroborate research findings in one discipline with those in another and of providing more integrated and comprehensive explanations of the research results.

The generalizations discussed in the succeeding paragraphs must be seen as emerging from a fairly new area of study and one that, at present, lacks both a well-formulated research paradigm and a large body of survey and observational studies to support its conclusions. Consequently, it is possible that future research with more sophisticated conceptual and analytical models and better data may contradict some of the generalizations made here. It seems more likely, however, given the persistence of the results discussed and their occurrence in studies that are quite diverse in conceptualization and methodology, that many, if not all, of these conclusions will hold up over time.

Among the generalizations that can be derived from the research reported in this volume and from related studies are the following:

1. *The most common basis for instructional grouping is student ability.*

Several research reviews and studies support this conclusion. Tracking by ability is frequently found at the secondary level (Alexander & McDill, 1976; Good & Marshall, Chapter 2, this volume; Metz, 1978; Persell, 1977; Rosenbaum, 1976). Within-class ability grouping occurs frequently at the elementary level; it is most common for reading instruction, somewhat less common for mathematics instruction and is infrequent in other curricula (Austin & Morrison, 1963; Barr, 1975; Hallinan & Sørensen, 1983). Groups that are heterogeneous with respect to ability are seldom found. If teachers attempt to manipulate the composition of instructional groups with respect to other student characteristics, such as gender, ethnicity, socioeconomic status, or friendship choices, they seem to do so without abandoning efforts to create ability groups. Thus, theoretically at least, the motivation governing instructional grouping appears to be to create groups that are homogeneous in ability in order to facilitate teaching and learning.

2. *In practice, the assignment of students to tracks or within-class ability groups is, to a large extent, independent of individual students' ability or academic achievement.*

Factors affecting the assignment of students to tracks and ability groups include the distribution of student aptitudes or achievement in a school or classroom, organizational needs and constraints within a school or classroom, student management and student discipline (Barr & Dreeben, 1983; Dreeben, Chapter 5, this volume; Eder, 1981; Hallinan & Sørensen, 1983). The shape of the ability or achievement distribution of a class affects the homogeneity of the ability groups that are formed, with a wider distribution generally resulting in greater heterogeneity. Thus ability-group homogeneity varies within and across classes. The class distribution also affects the mean achievement of each ability group. This implies that the mean achievement of, say, the low group in one class could differ significantly from the mean of the low group in a class with a different achievement distribution.

Organizational constraints affect the number and size of ability groups in a classroom independent of the achievement distribution of the class. Constraints on teachers' time usually preclude their forming more than three or four ability groups within a classroom. Limited teaching resources and materials prevent the assignment of a large number of students to any single group. The norms of teachers and parents regarding equal instructional time for all students support the formation of equal-sized groups. Evidence that these factors influence group assignment is found in studies showing little variation in the number and size of ability groups across classrooms regardless of the shape of the achievement distributions of these classes. The stability of tracks and ability groups over the school year despite change in the rate of learning of some students is further evidence of the effects of these factors on grouping assignment. Consequently, group level should be viewed as a relative rather than absolute designation since the assignment process is influenced by school and classroom characteristics as well as by an individual student's capabilities and academic performance.

3. *The mode of instruction differs across tracks and ability groups.*

Empirical evidence demonstrates that different modes of instruction are used in different tracks and ability groups. In low tracks and ability groups teachers present material at a slower pace than in higher-level groups (Barr, 1975; Barr & Dreeben, 1983). More time is spent off-task for administrative and disciplinary reasons (Eder, 1981; Evertson, 1982; Persell, 1977). Instructional materials are less interesting and challenging for students (Rosenbaum, 1976). Teachers spend less time preparing lessons and engage in poorer teaching (Hargreaves, 1967; Rosenbaum, 1976). In general students in low tracks and ability groups are given fewer and poorer opportunities to learn than their peers in higher level groups.

4. *Behavioral processes differ across and within tracks and ability groups.*

Several studies show that student behavior during instruction differs by level of track or ability group. An example is task-related interaction between students and their teachers and between students and their peers. The amount of verbal exchange about an instructional task that occurs between students and their teachers or peers varies by level of track or ability group with more task-related interaction occurring at higher ability levels (Johnson, 1981; Peterson, Janicki, & Swing, 1981; Webb, 1980, 1982; Webb & Kenderski, Chapter 9, this volume). Because task-oriented interactions are believed to promote learning by helping students organize and assimilate material, differences in the quantity of student interactions across group levels may be a mechanism through which grouping affects learning. (Peterson, Wilkinson, Spinelli, & Swing, Chapter 8, this volume.)

The amount of student interaction that is off-task is also related to group level. Student inattention to learning tasks has been shown to increase as group level decreases (Eder, 1981). Student behavior is found to be more disruptive and destructive of teacher's instructional efforts in low tracks and ability groups than in higher-level groups (Evertson, 1982; Metz, 1978; Persell, 1977; Schwartz, 1981). This relationship between ability level and off-task behavior is maintained even when individual characteristics of students such as ability or achievement are controlled. Students and teachers apparently develop group-specific behavioral norms that tolerate greater inattention among students in lower-level groups.

5. *Student social status differs across and within tracks and ability groups.*

Studies of peer relations in tracked and ability-grouped classes show marked differences in the social status of students at different ability levels (Cusick, 1973; Good & Marshall, this volume; Hargreaves, 1967; Schwartz, 1981). Since academic status is a component of social status, high-tracked or -grouped students tend to be more popular with their schoolmates than their lower-tracked peers. At the same time, students in low tracks and ability groups are often labelled "slow learners" by teachers and classmates, which lowers their esteem in the eyes of their peers.

Differences in social status exist within groups as well as between tracks of groups. Social influence and power are exerted more often in a group by those students who have higher academic status (Cohen, Chapter 10, this volume; Peterson, Wilkinson, Spinelli, & Swing, Chapter 8 this volume). In tracks or ability groups that are fairly heterogeneous with respect to ability, pronounced status differences can occur. Thus, by defining and displaying a status hierarchy, tracking and ability grouping powerfully affect the social position of students within a school or classroom. The more explicit the academic hierarchy, the greater appears to be the effect of level of grouping assignment on social status.

6. *Tracking and ability grouping are deterrents to learning for students assigned to low groups.*

In an early summary of research (28 studies) on the effects of ability grouping on students' academic achievement, Eash (1961) concluded that ability grouping actually may be detrimental to children in the average- and lower-ability groups. In a more recent review of 217 studies, Persell (1977, p. 92) found that "there is a slight trend toward improving the achievement of high ability groups but that is offset by substantial losses by the average and low groups." The research reported in this volume leads to the same conclusion, namely, that tracking and ability grouping depresses growth in academic achievement for students in low groups.

The multidisciplinary research reported in these chapters identifies the mechanisms through which the negative effect of assignment to a low track or ability group occurs. These are differences in the mode of instruction and learning climate, behavioral differences of teachers and students and different social psychological processes that occur across group levels. Whether efforts to change the learning environment, or to intervene in the behavioral and social processes that occur within ability groups, would alter the negative effect of being assigned to a low group has not yet been established. However, Cohen's work (for a review, see Cohen, 1982) on changing status expectations within small groups suggests the possible success of intervention in the learning process for students in low tracks or ability groups. At present, the great majority of studies demonstrate that assignment to a low track or ability group places students at a disadvantage in terms of learning opportunities.

Implications for Research on Instructional Groups

Several implications follow from these generalizations about instructional grouping. Some of these implications concern directions for future research on tracking and ability grouping while others pertain to current and future educational practice and policy. Implications for research are discussed first.

1. *Research on instructional grouping needs to be more theoretical.*

Instructional group research, for the most part, has been either atheoretical or theoretically weak. This may explain why so few consistent results have been found in these studies. Questions have been poorly or narrowly framed and work has been carried out from an applied perspective without the benefit of parallel basic research. What is seriously lacking is the application to learning of well-developed theoretical models of organizational, social psychological, and cognitive processes. Stodolsky (Chapter 7, this volume) presents a general framework for studying instructional grouping in the classroom. One could view the present challenge to researchers as that of applying existing theories to this framework or formulating new conceptualizations that explain the linkages between student outcomes and student, classroom, school, and community variables.

At the same time, greater clarity is called for in defining conceptual and operational variables in models of grouping effects on student outcomes. Two typologies of grouping arrangements are provided in this volume. Stodolsky distinguishes between teacher-led and peer-directed groups and presents a classification system for the latter. Bossert *et al.*, present a typology of groups, based on an organic–mechanistic dimension, that focuses on the amount of task differentiation in groups. By relying on these or other conceptually grounded typologies of groups, researchers can make more explicit exactly what kind of grouping practice they are studying. This is rarely done now in any systematic way with the result that it is difficult to compare or replicate extant research studies. A major step toward conducting more rigorous research on instructional grouping is to carefully define and outline the kind of grouping practice to be examined and to relate variation in type of group to salient student outcomes.

2. *Systematic research from a multidisciplinary framework would be useful to better understand instructional grouping.*

The utility of an interdisciplinary approach to the study of instructional grouping is demonstrated in the present volume. The sociological perspective represented by Bossert *et al.*, Dreeben, Rosenbaum, Sørensen and Hallinan identifies the organizational factors at the school, classroom, and group level that affect the formation, stability, and outcomes of grouping. The process–product tradition reflected in the chapters by Cohen; Good and Marshall; Webb and Kenderski; and Peterson, Wilkinson, Spinelli, and Swing provides an understanding of the cognitive, social, and behavioral processes through which structural and organizational factors influence student outcomes. The sociolinguistic paradigm, seen in the work of Au and Ignacio, Eder and Felmlee, and Wilkinson makes clear the role of student–teacher and peer–peer communication and social interaction in the learning process. Although each of these studies was designed separately, juxtaposing their results and attempting to integrate their perspectives and conceptualizations provide a fuller explanation of the process through which grouping affects students.

Rigorous interdisciplinary research could be conducted more effectively if a single research program were to bring together researchers from complementary disciplines to engage in joint study of grouping effects using the same data set. One could imagine designing a large study on instructional grouping which would permit survey analysis as well as observational and case studies. The appropriate site for such ongoing systematic research would be a federally funded research laboratory or center. If federal support for such large educational research endeavors is withdrawn, greater collaboration is called for among individual researchers studying instructional grouping from different perspectives in order for the work to proceed in an orderly and efficient manner. Conferences and volumes such as the present one are vehicles for this kind of collaboration and dissemination.

3. *In studying grouping effects on student outcomes, grouping practices and mode of instruction should be seen as separate factors.*

A grouping practice is the way students are assigned to tracks or groups for instruction. It includes decisions about the basis for assigning students to tracks or groups; the number, size, and composition of tracks or groups; and the stability of group membership over time. Mode of instruction has to do with the way students are taught within groups. It includes methods of instruction, resources and materials, pacing, and methods of evaluation.

Grouping practices and mode of instruction may vary separately or jointly across tracks or group levels. This situation raises a number of research issues. For example, how do resource allocation or teaching methods vary across group level? Is the quality of teaching related to track or group level? Extant research studies show that mode of instruction tends to be inferior in lower groups. More systematic research on this topic is needed in order to separate the effects of group level from those of instructional methods and learning context of a group. Ultimately, it should be possible to determine which particular grouping practices are most effective at each ability level and how their effectiveness relates to the mode of instruction that distinguishes that level. Thus, research models should specify how grouping practices and modes of instruction interact to enhance or hinder learning.

4. *Multivariate models of grouping effects should be used.*

Much of the previous research has analyzed instructional grouping using a bivariate model that relates track or ability-group level to level of student achievement or to growth in achievement. Factors affecting assignment to tracks or ability groups, as well as characteristics of the groups other than level of achievement, have largely been ignored. Relevant group characteristics that may affect academic performance include the size of the group, its sex, ethnic and socioeconomic status (SES) composition, the heterogeneity of the group with respect to student ability or achievement and the stability of the group membership over the school year. In addition, the mode of instruction must be taken into account. Furthermore, relevant student characteristics such as age and gender and ethnicity need to be controlled. Finally, interactions among group properties, student characteristics, and mode of instruction should be tested. In short, what is needed is a multivariate model specifying the effects of group properties, student characteristics, and instructional mode, as well as track or group level, on student learning.

5. *Consequences of grouping for nonacademic outcomes should be examined.*

Because the focus of most research on instructional grouping has been on academic achievement, other possibly unintended consequences of instructional grouping have not been studied in any systematic way. For example, only a few studies look at grouping effects on students' social status, self-perception, attitudes, or aspirations. Rarely does one find a study hypothesizing an interaction effect of group level and other student or group characteristics on noncognitive outcomes. This hiatus in the research on grouping is unfortunate because the effects of grouping on nonacademic outcomes may be one of the mechanisms through which grouping effects on achievement occur. It may be for example, that the effects of group level on the social status or self-esteem of a student influences the student's motivation to learn. One can also imagine direct positive effects of being in the low group on learning but indirect negative effects mediated through the effects of group level on social status or self-confidence. Consequently, before grouping effects on cognitive outcomes can be fully understood, a close examination of the relationship between grouping and noncognitive outcomes must be undertaken.

Implications of Instructional-Group Research for Educational Practice and Policy

In addition to implications for future research, the work described in this volume has important practical implications. These implications may be useful for teachers and administrators as well as for educational policy makers.

1. *Students should be reassigned to different tracks or ability group levels if their rate of learning warrants it.*

Instructional-group research indicates that once students are tracked or ability grouped, they often remain at the same group level for the duration of a school year or even for their entire educational careers. Because instruction within tracks or ability groups is generally geared to the mean ability of the students at that level, permanent assignment at a certain group level is disadvantageous for those pupils whose rate of learning changes over time. For example, it deprives late bloomers, who are initially assigned to low groups, of educational opportunities that could challenge their intellectual capabilities. Teachers need to be more responsive to changes in student achievement and motivation and more willing to reassign students to different tracks or ability groups when their rate of learning differs from other students in their group.

Unfortunately, student mobility across tracks and ability groups can create new problems for teachers (Hallinan & Sørensen, 1982). Because grouping is in part a response to organizational needs, there is a cost to reassigning students in terms of organizational and management problems, parental pressure and student preference. Track and ability-group stability is clearly the easier strategy for a teacher. Nevertheless, the importance of assigning students to their appropriate ability-level requires seeking alternate solutions to the organizational problems that result from flexibility in assignment.

2. *When teachers use tracking or ability grouping for instruction, they should make every effort to ensure that the quality of instruction is constant across levels.*

Research shows that the amount and quality of instruction is generally poorer in low tracks and ability groups than in higher ones. At the same time, students in low tracks and ability groups have more discipline problems and greater inattention than their peers in higher groups. This kind of diminished learning environment leads to slower growth in achievement. It may be that a student is restrained more by poor-quality instruction or amount of time spent off-task than by any limitations in ability to learn. Similarly, inappropriate student behavior may be the result of boredom in the absence of a stimulating learning environment rather than disinterest in learning. Thus, teachers need to look beyond the academic achievement of a student or the track or ability-group level to which the student was assigned to the mode of instruction and learning climate found within the pupil's track or group in order to account for academic performance.

There are several options that teachers can explore in an effort to improve the learning climate in low tracks and ability groups. These include limiting the size of low groups, modifying the length of instruction, and altering the reward system. In addition, experimenting with a variety of teaching methods may also help engage the students' interest in learning. Different strategies may be needed at different stages of the learning process. Efforts to improve instruction for low-grouped students could remove a significant part of the negative effect of assignment to low groups for these students.

3. *Student characteristics must be taken into account in assigning students to peer work groups.*

As clearly demonstrated in Cohen's research (Chapter 10, this volume), status characteristics of students affect their patterns of interaction in small groups; higher-status students have higher rates of interaction and greater interpersonal influence than lower-status students. These findings have important implications for teachers who use peer work-groups for instructional purposes. Teachers are faced with the task first of recognizing salient status characteristics and then of weakening their negative effects on learning. A number of intervention strategies to alter status have been employed somewhat successfully, at least in the short run. One approach is to pretrain low-status students to better prepare them for interaction within a group (Cohen, 1982). Other solutions should be sought in order to increase the effectiveness of peer interaction for the learning process (Peterson, Wilkinson, Spinelli, & Swing, Chapter 8, this volume; Swing & Peterson, 1982.) These could reside, for example, in the status changes that occur when schools and classrooms are desegregated and in the manipulation of an academic-status hierarchy through teacher emphasis on success in noncognitive as well as cognitive tasks.

A more dramatic and possibly more effective long range method of reducing status effects on learning would be to change the nature of instructional tasks. Teachers could emphasize the process of working on a task as well as its successful completion. The nature of the product could be altered. Cooperative learning could replace competitive learning. Tutorial relationships could be established within peer work groups to increase the participation of the low status student. Success in changing the negative effects of status on student learning should make peer work groups a more successful instructional technique. Failure to remove the effects of status on learning makes the use of peer work groups vie with tracking and ability grouping as questionable educational practices for low ability and low status students.

4. *Assigning labels to students based on their track or ability group level is inappropriate.*

Labels are often interpreted as describing a student's ability. Thus, being in the low track or ability group suggests that the student is a slow learner. More accurately, group levels should be seen not as individual characteristics of students but rather as a reflection of the distributional properties of a class. A low group is only low relative to the other groups in a particular class; students in a low group in one class may indeed be equivalent in ability to those in a medium or even high group in another class having a different achievement distribution. Moreover, even within a single class, ability groups vary in heterogeneity and often the range of achievement across ability group levels overlaps considerably. Thus a student at the high end of the achievement distribution in a low group may have a higher achievement score than some students in the middle- or even high-ability groups. To assume that all students in low-ability tracks or groups have the same learning potential is erroneous and misleading.

The obvious danger of labeling, of course, is that students reify labels; a self-fulfilling prophecy then occurs with learning being obstructed by lack of motivation, effort, or self-confidence. Teachers could minimize the negative effects of labels by not using them themselves and by bringing to parents' attention the fact that group levels are meaningful only in relation to the particular class of which a student is a member.

5. *Teachers need to be aware of the unintended consequences of tracking and ability grouping.*

Some unintended consequences of grouping practices pertain to educational and career opportunities. When assignment to a low track or ability group is a fairly permanent arrangement, decisions made about children early in their lives have long-range consequences for the kind of education and career they can pursue. One could question what kind and how much information is available to teachers about students in, say, the first or second grade that could justify such an important educational decision. Even if tracking or ability grouping permits student mobility across groups, temporary assignment to a low track or group may still limit course options at a later date. On the other hand, assignment to high-ability tracks or groups may demand a heavy academic commitment that prevents participation in cocurricular and nonacademic activities. Teacher awareness of the constraints that grouping places on student choices may lead to greater flexibility within an academic program and efforts to minimize the limitations imposed on students by grouping.

Other unintended consequences of grouping, as shown by research studies, involve students' social and emotional development. Grouping is found to affect students' social relations and social status within a grade or class. It is also related to a students' self-confidence and self-esteem. Assignment to a low track or group is often accompanied by loss of social status and self-esteem whereas assignment to a high group often results in greater popularity and respect. Considerable research is needed before the effects of grouping on nonacademic outcomes and their relationship to learning is clearly specified. In the meantime, teachers should at least be aware of the many noncognitive consequences of grouping and attempt to construct a classroom environment that minimizes the negative effect of grouping on students' social and emotional well-being.

Conclusions

The effects of instructional grouping as practiced in United States schools today are not consistent with the educational goals of maximizing student intellectual potential and creating equal opportunities for educational achievement. Factors that affect the formation of tracks and ability groups and their stability over time are obstacles to the creation of homogeneous instructional groups. When groups are heterogeneous it is more difficult for teachers to gear instruction to the capabilities of their students. Even when groups are homogeneous, the success of grouping varies by level of track or ability group. Students assigned to high and medium groups generally are placed in a learning environment that is more conducive to learning than students in low groups. The poorer educational climate of low-ability groups and tracks and the social and behavioral problems that characterize students in these groups make assignment to a low group a deterrent to learning. Thus, instructional grouping fails to provide high-quality instruction for all students and to ensure equal opportunities for learning across ability levels.

Despite the negative consequences of tracking and ability grouping for low-grouped students, it would be premature at this point to recommend that the practice of grouping students for instruction be discontinued. Present and future research promises to provide a better understanding of how some of the negative effects of grouping can be avoided and how conflicting organizational and instructional goals can be met. Research aimed at illuminating the cognitive, psychological, and social processes that occur in tracks and ability-grouped classes should make a significant contribution to this understanding. At the same time, educational practices and policies that encourage flexibility in group assignments, attention to the quality of instruction at all group levels, and efforts to reduce the negative social consequences of grouping should increase the likelihood that instructional grouping has a positive impact on learning for students at all ability levels.

References

Alexander, K. L. & McDill, E. Selection and allocation within schools: some causes and consequences of curriculum placement, *American Sociological Review*, 1976, *41*, 963–980.

Austin, M., & Morrison, C. *The first R: The Harvard report on reading in elementary school*. New York: Macmillan, 1963.

Barr, R. How children are taught to read: Grouping and pacing. *School Review*, 1975, *83*, 479–498.

Barr, R., & Dreeben, R. *How schools work*. Chicago: University of Chicago Press, 1983.

Cohen, E. Expectation states and interracial interaction in school settings. *Annual Review of Sociology*, 1982, *8*, 209–230.

Cusick, P. *Inside high school*. New York: Holt, Rinehart & Winston, 1973.

Eash, M. J. Grouping: What have we learned? *Educational Leadership*, 1961, *18*, 429–434.

Eder, D. Ability grouping as a self-fulfilling prophecy: A macroanalysis of teacher-student interaction. *Sociology of Education*, 1981, *54*, 151–161.

Evertson, C. Differences in instructional activities in average- and low-achieving junior high English and Math classes. *Elementary School Journal*, 1982, *82*, 329–350.

Hallinan, M., & Sørensen, A. B. *The formation and stability of instructional groups*. Unpublished manuscript, University of Wisconsin, Madison, 1983.

Hargreaves, D. *Social relations in a secondary school*. London: Routledge & Kegan Paul, 1967.

Johnson, D. W. Student-student interaction: The neglected variable in education. *Educational Researcher*, 1981, *10*, 5–10.

Metz, M. *Classrooms and corridors: The crisis of authority in desegregated secondary schools.* Berkeley, California: University of California Press, 1978.

Persell, C. *Education and inequality: The roots and results of stratification in America's schools.* New York: The Free Press, 1977.

Peterson, P. L., Janicki, T. C., & Swing, S. R. Ability x treatment interaction effects on children's learning in large-group and small-group approaches. *American Educational Research Journal*, 1981, *18*, 453–473.

Rosenbaum, J. *Making inequality: The hidden curriculum of high school tracking.* New York: Wiley, 1976.

Schwartz, F. Supporting or subverting learning: Peer group patterns in poor tracked schools. *Anthropology and Education Quarterly*, 1981, *12*, 99–121.

Swing, S. R., & Peterson, P. L. The relationship of student ability and small-group interaction to student achievement. *American Educational Research Journal*, 1982, *19* (2), 259–274.

Webb, N. M. A process-outcome analysis of learning in group and individual settings. *Educational Psychologist*, 1980, *15*, 69–83.

Webb, N. M. Peer interaction and learning in cooperative small groups. *Journal of Educational Psychology*, 1982, *74*, 642–655.

Author Index

A

Ackland, H., 56, *68*
Adams, R. S., 117, *122*
Airasian, P. W., 109, *123*
Alexander, K. L., 56, *67*, 87, *102*, 189, *207*, 230, *239*
Allen, V. L., 145, *151*
Allington, R. L., 25, 27, 29, *37*, 47, *50*
Alpert, J. L., 26, *37*
Alwin, D. F., 56, *68*, 87, *103*, 189, *207*
Amaria, R. P., 120, *122*
Anderson, L., 34, *37*
Anthony, B., 41, 49, *50*, 184, *186*
Aron, J., 190, 191, 206, *208*
Aronson, E., 41, *50*, 120, *122*
Au, K. H., 209, 210, 211, 222, *224*, *225*
Austin, M., 193, *207*, 230, *239*

B

Bane, M. J., 56, *68*
Bargh, J. A., 167, *170*
Barker Lunn, J. C., 70, *83*, 96, *102*
Barnes, D., 119, *122*
Barnett, B., 40, 44, 48, *50*
Barr, R., 46, *50*, 71, 72, 73, *83*, *84*, 108, 113, *122*, 230, 231, *239*
Bar-Tal, D., 114, *122*
Beckerman, T., 32, *37*
Bentler, P. M., 164, *170*
Berger, J., 171, 172, 173, 177, 180, 182, *186*, *187*
Berger, P. L., 109, *122*
Berliner, D. C., 114, 117, *123*
Biber, B., 110, *123*
Biddle, B. J., 4, 5, *11*, 117, *122*, *123*
Bidwell, C., 41, 44, *50*
Biran, L. A., 120, *122*
Blaney, N., 41, *50*
Blau, P., 41, *50*
Blumenfeld, P. C., 110, *123*
Boggs, S. T., 210, *225*
Borg, W. R., 70, *84*
Bossert, S. T., 34, 36, *37*, 40, 43, 44, 45, 46, 48, *50*, *51*, 109, 110, *123*
Braverman, M. T., 132, *151*
Brewer, W. F., 223, *225*
Bruce, B. C., 223, *225*
Bryan, M. M., 69, *84*
Burr, M. Y., 70, *84*
Buss, R., 132, *151*

C

Cahen, L. S., 114, 117, *123*
Calculator, S., 5, *12*, 127, 128, 130, *152*
Calfee, R. C., 209, *225*
Calkins, R., 209, 210, *225*
Campbell, E. Q., *67*
Cazden, C. B., 114, 115, 119, 120, *123*, 127, *151*, 209, *225*
Chiang, 127, 128, *152*
Cicourel, A. V., 59, 62, *67*
Cohen, B. P., 177, *186*
Cohen, D., 56, *68*
Cohen, E. G., 41, 49, *50*, 173, 175, 176, 181, 184, 185, *186*, *187*, 233, 237, *239*
Cohen, M., 4, *11*
Coleman, J. S., *67*
Combs, E., 5, *12*
Cook, M. A., 189, *207*

Cook, T., 173, *187*
Cooper, C. R., 149, *151*
Coulthard, R., 127, *151*
Crandall, V. C., 155, 169, *170*
Crandall, V. J., 155, 169, *170*
Croll, P., 114, 117, *123*
Cronbach, L. J., 157, *170*
Crowell, D. C., 209, 210, *225*
Crowell, R., 60, *68*
Cullian, L. K., 154, 155, 158, 167, *170*
Cusick, P., 232, *239*

D

Dahlöff, U. S., 45, *50*, 72, *84*
Daniels, J. C., 70, *84*
Davis, S. A., 60, *68*, 190, 206, *207*
Dewar, J., 29, *37*
Dillon, B. A., 214, *225*
Dishaw, M. M., 114, 117, *123*
Dollaghan, C., 127, *152*
Douglas, J. W. B., 86, *102*, 190, *207*
Dowhower-Vuyk, S., 210, *225*
Doyle, W., 5, *11*, 16, 34, 35, 36, *37*, 49, *50*, 110, *123*
Dreeben, R., *84*, 108, 113, *122*, 231, *239*
Drews, E., 19, *37*
Duncan, O. D., 164, *170*
Dunkin, M. J., 4, 5, *11*, 117, *123*
Dunn, L., 130, *151*
Duran, R. P., 209, *225*
Durkin, D., 224, *225*

E

Eash, M. J., 232, *239*
Ebmeier, H., 30, 31, *37*
Eder, D. J., 5, *11*, 26, 27, 28, 32, *37*, 47, *51*, 71, *84*, 87, 91, 95, *102*, 190, 194, 195, 205, 206, *207*, 231, 232, *239*
Elias, P., 46, *51*
Entwistle, D., 190, 206, *207*
Erickson, E. L., 60, *68*
Erickson, F., 210, *225*
Esposito, D., 15, *37*
Evertson, C., 24, *37*, 46, 48, *51*, 231, 232, *239*
Eysenck, H. J., 157, *170*
Eysenck, S. B. G., 157, *170*

F

Fanshel, D., 127, *151*
Felmlee, D., 190, 194, 195, *207*
Ferguson, T. L., 46, *51*, 117, *124*
Filby, N. N., 44, 48, *51*, 114, 117, *123*
Findley, W. G., 69, *84*
Fisher, C. W., 114, 117, *123*
Florio, S., 210, *225*
Flynn, P., 5, *12*
Forman, E. A., 119, *123*
Furst, N., 5, *12*

G

Gallimore, R., 209, 210, *225*
Galton, M., 114, 117, *123*
Geser, D., 114, *122*
Gintis, H., 56, *68*
Gleser, G. C., 157, *170*
Goffman, E., 190, *207*
Goldberg, M. L., 16, *37*, 71, *84*
Good, T. L., 5, *11*, 28, 29, 30, 31, 32, 36, *37*, 44, *51*, 120, *123*, 126, *151*
Gospodinoff, K., 191, 206, *208*
Gouldner, H., 61, *68*
Grannis, J. C., 115, *123*
Grice, P., 127, *151*
Griffin, M. P., 209, *225*
Grouws, D., 30, 31, *37*, 120, *123*
Gump, P. V., 114, 117, *123*

H

Haller, E. J., 60, 64, *68*, 190, 206, *207*
Hallinan, M. T., 71, *84*, 86, 90, 95, 100, 102, *103*, 113, *123*, 230, 231, 236, *239*
Hamblin, R. E., 40, *51*
Hamilton, V. L., 110, *123*
Hannahs, N., 209, *225*
Hannan, M. T., 193, *207*, *208*
Hanson, S. G., 184, *186*
Hanushek, E. A., 91, *103*
Hao, R., 210, *224*
Hargreaves, D., 23, 24, *37*, 231, 232, *239*
Harnischfeger, A., 46, *51*
Harris, A., 173, *187*
Hartill, R. M., 71, *84*
Hauser, R. M., 56, *68*, 87, *103*, 189, *207*

Hayduck, L., 190, 206, *207*
Heathers, G., 24, *37*
Hertweck, A., 5, *12*
Hertz-Lazarowitz, R., 114, 120, *123*
Heyns, B., 56, *68*, 87, *103*
Hobson, C. J., *67*
Hotelling, H., *170*
Humphreys, P., 172, 180, *187*
Hunter, D., 47, *51*
Husen, T., 86, *103*

I

Intili, J. K., 175, 176, 181, 184, 185, *186*

J

Jackson, B., 86, *103*
Jackson, J. E., 91, *103*
Janicki, T. C. 5, *12*, 116, 120, 121, *123*, 126, 131, 139, *151*, 154, 155, 156, 166, 167, *170*, 231, *240*
Jencks, C., 56, *68*
Johnson, D. W., 119, 120, *123*, *124*, 153, *170*, *231* *240*
Johnson, P., 62, *68*
Johnson, R., 119, 120, *123*, *124*
Jones, J. D., 60, *68*
Jordan, C., 209, 210, *225*
Justman, J., 16, 18, 20, 35, *37*, 71, *84*

K

Kahl, J., 63, *68*
Kandel, D. B., 63, *68*
Kasarda, J., 41, 44, *50*
Katkovsky, W., 155, 169, *170*
Keddie, N., 23, 24, *37*
Kellaghan, T., 109, *123*
King, J., 149, *151*
Kitsuse, J. I., 59, 62, *67*
Koehler, V., 5, *11*
Kounin, J., *51*
Kulik, C., *37*
Kulik, J., *37*

L

Labov, W., 127, *151*
Lahaderne, H., 206, *208*
Leacock, E., 23, *37*
Leiter, K., 190, 206, *208*
Leith, G. O. M., 120, *122*
Lesser, G. S., 63, *68*
Liebert, P., 130, *151*
Lockheed, M. E., 173, *187*
Loret, P. G., 90, *103*
Luchins, A. S., 109, *123*
Luckmann, T., 109, *122*

M

McDermott, R. P., 5, *11*, 25, 27, *38*, 47, *51*, 190, 191, 206, *208*
McDill, E. L., 56, *67*, 87, *102*, 189, *207*, 230, *239*,
McDonald, F. J., 46, *51*
McPartland, J., *67*
Madaus, G. F., 109, *123*
Marliave, R. S., 114, 117, *123*
Marquis, A., 149, *151*
Martus, M., 209, *225*
Mason, M., 210, 222, *225*
Mata, S., 184, *186*
Medley, D. M., 4, *12*
Meece, J., 110, *123*
Mehan, A., 5, *12*, 127, *151*
Mehan, H., 110, *123*
Mergendoller, J., 44, *51*
Merritt, M., 5, *12*
Metz, M., 24, 29, *38*, 190, 205, 206, *208*, 230, 232, *240*
Michelson, S., 56, *68*
Miller, L. K., 40, *51*
Minuchin, P., 110, *123*
Monk, D. H., 45, 46, *51*
Mood, A. M., *67*
Moore, J. E., 114, 117, *123*
Moore, M. S., 149, *151*
Morrison, C., 193, *207*, 230, *239*
Morrison, V. B., 45, *51*

N

Nanda, H., 157, *170*
Neale, J., 130, *151*

O

Olexa, C., 87, *103*

P

Parchment, C., 184, *186*
Parsons, T., 4, *12*
Passow, A. H., 18, *37*, 71, *84*
Pekarrik, E., 130, *151*
Persell, C., 15, 24, *38*, 230, 231, 232, *240*
Peterson, P. L., 5, *12*, 45, *51*, 116, 120, 121, *123*, 126, 131, 132, 139, 142, 143, 144, 149, 150, *151*, *152*, 154, 155, 156, 166, 167, *170*, 231, 237, *240*
Power, C., 44, *51*
Preston, A., 155, 169, *170*
Prinz, R., 130, *151*

R

Rajaratnam, N., 157, *170*
Redfield, D. L., 223, *225*
Rehberg, R. A., 56, 59, *68*
Rist, R. C., 44, 47, *51*, 61, *68*, 69, *84*
Rosenbaum, J. E., 15, 24, *38*, 53, 55, 56, 58, 60, 63, 65, 67, *68*, 87, *103*, 189, 190, 206, *208*, 230, 231, *240*
Rosenholtz, S. H., 65, *68*
Rosenholtz, S. J., 35, *38*, 41, 49, *51*, 65, *68*, 110, *123*, 171, 173, 182, 184, *186*, *187*
Rosenshine, B. V., 5, *12*, 125, *151*, 168, *170*
Rosenthal, E. R., 56, 59, *68*
Rothenberg, J., 49, *51*
Rousseau, E. W., 223, *225*
Ruddell, R. B., 214, *225*

S

Salomon, G., 109, *123*
Sands, M. K., 117, *123*
Sanford, J., 32, *38*
Sayles, L. R., 40, *51*
Schafer, W. E., 87, *103*
Scheflen, A. E., 190, *208*
Schul, Y., 167, *170*
Schwartz, F., 22, *38*, 232, *240*
Scott, C., 34, *37*
Sewell, W. H., 56, *68*, 87, *103*, 189, *207*
Shapiro, E., 109, 110, *123*
Sharan, S., 114, 116, 120, *123*, 153, *170*, 173, *186*
Shavelson, R. J., 33, *38*, 47, *51*
Shultz, J., 210, *225*
Sieber, R. T., *38*
Sikes, J., 41, *50*
Simon, B., 114, 117, *123*
Simpson, C., 65, *68*
Sinclair, J., 127, *151*
Sirotnik, K. A., 114, 117, *124*
Skon, L., 119, *124*
Slavin, R. E., 41, 49, *51*, 114, 116, 118, *124*, 153, *170*
Smith, M., 56, *68*
Snapp, M., 41, *50*
Sorensen, A. B., 4, 5, *12*, 55, 57, 62, *68*, 71, *84*, 86, 90, 95, 100, 102, *103*, 113, *123*, 193, *208*, 230, 231, 236, *239*
Spacke, E. B., 214, *225*
Speidel, G. E., 209, 210, *225*
Spinelli, F., 127, 128, *152*
Spiro, R. J., 223, *225*
Stallings, J., 45, *51*
Steinberg, Z., 127, *151*
Stern, P. R., 47, *51*
Stethan, C., 41, *50*
Stevenson, B., 184, *186*
Stinchcombe, A. L., 40, *51*
Stipek, D., 29, 31, *37*
Stodolsky, S. S., 46, *51*, 108, 109, 111, 113, 114, 115, 117, *124*
Stone, N., 184, *186*
Stulac, J., 172, *187*
Swing, S. R., 5, *12*, 120, *123*, 126, 132, 139, 144, 149, 150, *151*, *152*, 154, 155, 156, 166, 167, *170*, 231, 237, *240*

T

Tharp, R. G., 209, 210, *225*
Thompson, J. D., 40, *51*
Thompson, M., 209, *225*
Tikunoff, W., 44, *51*
Todd, F., 119, *122*
Tuma, N. Brandon, 193, *207*, *208*
Tyler, F., 31, *38*

V

Van Egmond, E., 171, *187*
Veldman, D., 32, *38*
Velez, W., 67, *68*
Vygotsky, L. S., 209, 213, *225*

W

Ward, B. A., 44, *51*
Watson, K. A., 210, *225*
Watson-Gegeo, K. A., 210, *225*
Webb, N. M., 5, *12*, 15, *38*, 116, *124*, 126, 127, 138, 139, 142, *152*, 154, 155, 158, 166, 167, 168, *170*, 231, *240*
Weinfeld, F. D., *67*
Weinstein, R. S., 28, 33, *38*, 48, *51*, 190, *208*
Weintraub, S., 130, *151*
Wertsch, J. V., 210, 222, 223, *225*
Wessels, K., 110, *123*
West, P., 71, *84*
Wheeler, S., 63, *68*
Wilcox, J. A., 87, *103*
Wiley, D. E., 46, *51*
Wilkinson, A., 127, 128, *152*
Wilkinson, L. Cherry, 4, 5, *12*, 125, 127, 128, 130, 132, *152*
Williams, T., 190, 206, *208*
Willis, H. D., 209, *225*
Wilson, B., 35, *38*, 41, 49, *51*, 110, *123*, 173, *187*
Wimpelberg, K., 46, *51*, 117, *124*
Wimpelberg, R. K., 108, *124*
Winer, B. J., 162, *170*
Wolfe, L. M., 164, *170*
Woodward, J., 40, *51*

Y

York, R. L., *67*

Z

Zander, A., 171, *187*
Zelditch, M., Jr., 171, 173, 177, 182, *186*
Zimiles, H., 110, *123*
Zukow, P. G., 210, 222, *225*

Subject Index

A

Ability distribution, diversity in, 73
Ability group assignment, *see also* Grouping
  achievement and, 91–94, 190
  achievement test administration in, 90
  in black schools, 89
  classroom-level analysis of, 94–98
  logit analysis in, 91–93
  nonblacks in, 92
  as polytomous dependent variable, 90
  race factors in, 85–102
  in vertically differentiated instructional high-school group, 87
  "victimizing" by, 17
Ability-grouped instruction, *see also* Instruction; Instructional arrangements
  behavioral differences in, 27
  observational research in, 25–32
Ability group formation
  ability distribution and, 95
  organizational constraints in, 95
Ability grouping, *see also* Grouping; Instructional grouping
  within classroom, *see* Within-class grouping
  defined, 15, 69, 72
  as deterrent to learning in low groups, 232
  difficulties in, 16–18
  shortcomings of, 29–30
Ability-grouping literature, research in, 53
Ability groups
  attention norms in, 189–207
  formation of, 71
Ability level, in conceptional attention norm model, 193
Ability testing, in student interaction and learning studies, 156–157
Achievement
  ability-group assignment and, 190
  student interaction and, *see* Student interaction and learning
Achievement distribution, between-classroom, 97
Achievement tests
  in ability-group assignments, 90
  in student interaction and learning studies, 157
Activity configurations, in classroom groupings, 42
Aptitude measures, in small-group process research, 129
Attention norms
  development of, in ability groups, 189–207
  group reassignment and, 200–204
  independent variables in, 194–195
  low- and high-ability groups compared in, 200–206
  outside interruptions and, 197–200
  quantitative model of, 193
Attention behavior, defined, 192
Attention shifts, rate of for fall and spring, 196
Attractiveness Status Characteristic, 178, 180

B

Between-group differentiation, 42
Black schools, ability-group assignments in, 89
Black students
  in ability-group assignments, 92–98
  in high-ability groups, 98–99
Buffering nonproduction factors, grouping and, 40

C

California Test of Basic Skills, 90, 174, 184, 186
Classes, *see also* Classroom
  configurational properties of, 82

Classes (*cont.*)
  distribution properties of, 76
  group sizes in, 80
Class grouping arrangements, 79–83, *see also* Classroom; Grouping
  implications of, 83
Classroom
  activity configuration in, 42
  instructional forms in, 107–112
  instructional groups in, 3–11
  study of groups in, 3
  teacher-led activity groups within, 94–95
  teacher–student division of labor in, 41
Classroom achievement, IQ and, 20–21
Classroom composition, task structure in, 33–34
Classroom grouping structures, 41–45, *see also* Grouping
  configurations in, 43–44
  high–low studies and, 47–49
Classroom group research
  model for integrating of, 6–7
  traditions in, 3–6
Classroom groups, *see also* Grouping; Groups; Instructional groups
  activity configuration in, 42
  helping-permitted types, 115
  traditions in study of, 3–6
Classroom interaction, *see also* Student interaction and learning
  Expectation States Theory and, 171–174
  Hispanic children in, 174–175
Classroom-level analysis versus individual-level analysis, 98–101
Classroom membership, achievement and, 21
Classroom racial composition
  ability-group assignments and, 90–94
  grade levels and, 97
  high- and low-ability groups in relation to, 96
  in individual-level analysis, 101
Class size, in first-grade reading groups, 75–76
Collective task conditions, in *Finding Out–Descubrimiento* curriculum, 175–176
Composition studies, 32–36
Cooperative groups
  ability composition in, 121
  for higher mental process goals, 120
  setting for, 114
Cooperative learning, experimental approaches to, 116
Cooperative peer work-group, defined, 115, *see also* Peer work-group processes
Curriculum grouping, sociological literature on, 56, *see also* *Finding Out–Descubrimiento* curriculum; Instructional groups

D

Desegregation, track mobility studies and, 60, *see also* Racial factors
Differentiation, between- and within-group forms and, 42
Diffuse status characteristics, in classroom interaction, 173
Division of labor, in classroom, 41

E

Educational setting, broader impact of, 109
Effective speaker, sociolinguistic model of, 127–128
Elementary classrooms, face-to-face instructional groups in, 113, *see also* First-grade reading groups
ETR method, *see* Experience–text–relationship method
Expectation States Theory, 171–174
  peer interaction and, 182, 185
Experience–text–relationship method, 211–214
  coding of student utterances in, 215–216
  coding of teacher questions in, 223
  group discussion in, 216
  research question results in, 219–222
  teacher–student interchange in, 216–218
Extroversion–introversion factor, achievement and, 154

F

Face-to-face instructional groups, typology of, 113–114
Finding Out–Descubrimiento curriculum, 174
  interaction measures in, 177–178
  learning outcome measures in, 176
  status measures in, 176–177
First-grade reading groups, 69–83
  class grouping assignments in, 79–82
  class properties and, 76–77
  class size and, 75–76
  formation of, 74–79
  grouping arrangement changes and, 79–82
  group range and, 78
  low-aptitude pupils in, 75, 78
  overlap among, 78

G

Group ability composition
  achievement and interaction related to, 162, 168
  defined, 154
Grouping, *see also* Groups; Instructional groups
  ambiguity of, 45
  as coordinative mechanism, 40–41
  in *Finding Out–Descubrimiento* curriculum, 175–176
  in industrial settings, 40
  instructional organization and, 39–50, 74
  internal class diversity in, 70
  lesson formats and, 46
  nature and effects of, 63, 72–73
  present research on, 69–72
  in productivity and social relationships, 40
  socioeconomic status and, 62–63
  within-class, 70–71, 85–86, 227
Grouping arrangements
  changes in, 79–82
  fall–spring class characteristics and distributive properties in, 79–80
Grouping research
  individual outcomes and, 70
  psychological bias in, 70
Grouping structures, *see* Classroom grouping structures
Grouping studies
  characteristic design of, 69
  configurational perspective in, 45–49
Grouping systems, *see also* Grouping; Instructional groups
  student outcomes and, 61–64
Group instruction, pace of, 74, *see also* Instructional groups
Group placement, effects of, 28
Group reassignment, attention norms and, 200–204
Groups, *see also* Classroom groups; Grouping
  formation of, 74–79
  instructional, *see* Instructional groups
  relative ability within, 154–155
Group sizes, in fall–spring classes, 80–81

H

Hawaiian students, in KEEP reading program, 209–213
Helping-permitted groups, 115
Heterogeneous classes, teachers in, 19–20
Heterogeneous groups
  case study of, 19–20
  defined, 18
  versus homogeneous, 15–36
  IQ of, 19
High-ability student, in process–product analysis, 144–145
High–low studies, classroom grouping structure and, 47–49
High school instructional groups, vertically integrated, 87
Hispanic children, in classroom interaction studies, 174
Homogeneous classes, teachers in, 19–20
Homogeneous groups
  case study of, 19–20
  defined, 18
  versus heterogeneous, 15–36
  IQ of, 19
  teachability of, 31

I

Individual-level analysis, classroom racial composition and, 101
Instruction
  internal dynamics of, 111–112
  typology of, 57–61
  whole-class, teacher-directed, 112
Instructional arrangements
  conceptual framework for analyzing causes and consequences of, 111
  factors involved in shaping of, 108–110
  as outcomes of macrolevel forces, 108
  planned achievements and, 110
Instructional forms, in classroom, 107–112
Instructonal grouping, *see also* Grouping; Instructional groups
  defined, 74
  generalizations on effects of, 230–233
  student ability in, 230
  in U.S. schools, 229
Instructional groups, *see also* Classroom groups; Grouping
  abstract conceptual analysis of, 58
  defined, 54–55
  future research on, 66–67
  heterogeneous versus homogeneous, 15–36
  implications for research on, 233–238
  organization and processes of, in classroom, 3–11

Instructional groups (*cont.*)
  redesign of structures for, 64–66
  selection decisions in, 64–66
  selection of individuals for, 55
  social attributes of, 54–55
  social organization of, 53–67
  sociological, sociolinguistic, and process-product traditions in, 3–6
  Sørenson model of, 57–58
  student outcomes and, 61–64
  teacher-led, 112–113
  vertically differentiated, 87
  within-classroom, 89, 107–112
Instructional organization, grouping and, 39–50, *see also* Classroom grouping structures
Instructional processes
  descriptive studies of, 116–118
  in peer work-groups, 107–122
Interaction variables, in student interaction and learning studies, 157–158
Internal class diversity, grouping and, 70
Internal dynamics, of instruction, 111–112
Iowa Test of Basic Skills, 90
IQs, of homogeneous versus heterogeneous groups, 19

K

Kamehameha Early Education Program (KEEP), 209–215

L

Learning, *see also* Achievement; Instruction
  environment and, 110
  meaning of, 110
Logit analysis, in ability-group assignment, 91–93
Logit models, in race-factor ability-grouping studies, 100
Low ability student, in process-product analysis, 145–148

M

Macrolevel forces, in instructional arrangements, 108
Mathematics Concept Level C/Form 1 subtest, 129
Math-Science Characteristic, 180
Metropolitan Achievement Test, 90
Multidimensional grouping structure, 43

O

Organic grouping structures, 44, 46
Outside interruptions, attention norms and, 197–200

P

Peabody Picture Vocabulary Test, 130
Peer effects, tracking and, 22
Peer instructional-work-groups
  defined, 114–116
  descriptive studies of, 116–118
  versus teacher-led groups, 112
Peer interaction, Expectation States Theory and, 182, 185
Peer tutoring, defined, 115
Peer tutors, children as, 120
Peer work-group processes, 107–121
  adult modeling in, 120
  factors influencing, 118–121
  in student interaction and learning studies, 157
Process-product analysis, 138–148
  high-ability student and, 144–145
  low-ability student in, 145–148
  problem explanations in, 142–143
  results compared with sociolinguistic analysis, 148–150
  students' achievement score correlations in, 138–143
Process-product paradigm
  merging with sociolinguistic paradigm, 125–151
  research questions in, 128–129
Process-product research, 126–127
Process-product tradition, in classroom group research, 5
Project Talent national sample, 62
Proximal development, zone of, 213
Public schooling, primary aim of, 229
Pupil Evaluation Inventory, 130

R

Race factors, in ability-group assignments, 85–102
Reading ability
  and participation in instructional activities, 173
  as specific status characteristic, 173
Reading Characteristic, 180
Reading errors, defined, 192
Reading groups, first-grade, *see* First-grade reading groups
Reading instruction, observational studies of, 25

Reading turn, defined, 192
"Receiving help" category, students' involvement in, 126–127
Relative ability within group, achievement and, 154–155
Replication, as scientific strategy, 53–54
Research questions, in process–product and sociolinguistic paradigms, 128–129, *see also* Small-group process research; Sociolinguistic research

S

Science Research Associates Achievement Test, 90, 129
Sequential grouping structure, 43
Small-group process research, 120, 125–151
  high achievers in, 134
  on-task procedural requests for action and information in, 136–137
  process–product analyses in, 138–148
  requirements versus achievement in, 133–135
  responses in, 130–131
  social status versus language knowledge in, 133–135
  sociolinguistic analysis in, 132–138
  student behavior coding in, 131
Small-group reading lessons, Vygotskian perspectives on discussion processes in, 209–224
Small-group settings, student interaction and learning in, 153–169
Socioeconomic status, grouping in, 62
  selection decisions and, 64
Sociolinguistic analysis
  on-task procedural requests for action and information in, 136–137
  results compared with process–product analysis, 148–150
  in small-group process research, 132–138
Sociolinguistic paradigm, research questions in, 128–129
Sociolinguistic research, 127–128
Sociolinguistic tradition, in classroom group research, 4–5
Sociological tradition, in classroom group research, 4
Specific status characteristics, in classroom interaction, 173–174
Status, reading ability as characteristic of, 173
Status hypothesis testing, in Talking and Working Together studies, 180
Status variables, in Talking and Working Together studies, 178–179
Streaming, defined, 69
Student ability, as basis for instructional grouping, 230
Student achievement, race factor in, 91–94
Student behavior categories, coding of in small-group process research, 131
Student interaction and learning
  achievement and, 153–154
  aptitude-treatment interaction in, 166
  classroom activities in, 159
  group ability composition and, 162, 168–169
  prediction of, 154
  results in, 160–166
  in small-group and whole-class settings, 153–169
  student assignment to groups in, 158
  student characteristics as predictors of, 163–165
  whole-class instruction in, 159–160
Student maturity, versus ability, 36
Student outcomes, grouping system effects on, 61–64
Student utterances, coding of in ETR method, 215

T

Talking and Working Together, 171–186
  intercorrelation of fall status measures and rate in, 179
  path model of, 180–185
  peer interaction versus status in, 182–183
  rate of, 178
  regression of CoStatus, 180
Task, direct path of relevance to, 172
Task structure
  classroom composition and, 33–34
  teacher's ability and, 35
Teacher
  low expectations of, 32
  task structure and, 34–36
Teacher behavior, attitudes and, 23
Teacher effects, on student types, 21
Teacher-led group, versus peer instructional work groups, 118
Teacher management, defined, 92
Textbook choice, effort and performance related to, 33
Tracking
  in British schools, 24
  class-biased versus meritocratic, 61

Tracking (*cont.*)
  defined, 15
  as deterrent to learning in low groups, 232
  difficulties in, 16
  in homogenous working-class neighborhoods, 24–25
  instructional content in, 23–24
  in instructional grouping, 229
  observational studies of, 21–25
  peer effects and, 22
  as structural or unitary phenomenon, 57
Track mobility studies
  difficulties in, 60
  of white-collar middle-SES communities, 59
Track system
  choice of for study, 66–67
  community college and, 67
  tournament type, 61
  white-collar high schools and, 67

U

United States educational system, studies of, 56–57
Unitary grouping structure, 43

V

Varied groups, teachability, of, 30–31
Videotaped reading lesson, subjects and materials in, 214–215
Vygotskian perspectives, on discussion processes in small-group reading lessons, 209–224
Vygotskian theory, 210–211

W

Whole-class settings, student interaction and learning in, 153–169
Whole-class teacher-directed instruction, 112
Within-class grouping, 70–71
  inequality of educational outcomes in, 86
  race factors in, 85
  in U.S. schools, 229
Within-group differentiation, 42

Z

Zone of proximal development, 213

EDUCATIONAL PSYCHOLOGY

continued from page ii

W. Ray Rhine (ed.). Making Schools More Effective: New Directions from Follow Through

Herbert J. Klausmeier and Thomas S. Sipple. Learning and Teaching Concepts: A Strategy for Testing Applications of Theory

James H. McMillan (ed.). The Social Psychology of School Learning

M. C. Wittrock (ed.). The Brain and Psychology

Marvin J. Fine (ed.). Handbook on Parent Education

Dale G. Range, James R. Layton, and Darrell L. Roubinek (eds.). Aspects of Early Childhood Education: Theory to Research to Practice

Jean Stockard, Patricia A. Schmuck, Ken Kempner, Peg Williams, Sakre K. Edson, and Mary Ann Smith. Sex Equity in Education

James R. Layton. The Psychology of Learning to Read

Thomas E. Jordan. Development in the Preschool Years: Birth to Age Five

Gary D. Phye and Daniel J. Reschly (eds.). School Psychology: Perspectives and Issues

Norman Steinaker and M. Robert Bell. The Experiential Taxonomy: A New Approach to Teaching and Learning

J. P. Das, John R. Kirby, and Ronald F. Jarman. Simultaneous and Successive Cognitive Processes

Herbert J. Klausmeier and Patricia S. Allen. Cognitive Development of Children and Youth: A Longitudinal Study

Victor M. Agruso, Jr. Learning in the Later Years: Principles of Educational Gerontology

Thomas R. Kratochwill (ed.). Single Subject Research: Strategies for Evaluating Change

Kay Pomerance Torshen. The Mastery Approach to Competency-Based Education

Harvey Lesser. Television and the Preschool Child: A Psychological Theory of Instruction and Curriculum Development

Donald J. Treffinger, J. Kent Davis, and Richard E. Ripple (eds.). Handbook on Teaching Educational Psychology

Harry L. Hom, Jr. and Paul A. Robinson (eds.). Psychological Processes in Early Education

EDUCATIONAL PSYCHOLOGY

J. Nina Lieberman. Playfulness: Its Relationship to Imagination and Creativity

Samuel Ball (ed.). Motivation in Education

Erness Bright Brody and Nathan Brody. Intelligence: Nature, Determinants, and Consequences

António Simões (ed.). The Bilingual Child: Research and Analysis of Existing Educational Themes

Gilbert R. Austin. Early Childhood Education: An International Perspective

Vernon L. Allen (ed.). Children as Teachers: Theory and Research on Tutoring

Joel R. Levin and Vernon L. Allen (eds.). Cognitive Learning in Children: Theories and Strategies

Donald E. P. Smith and others. A Technology of Reading and Writing (in four volumes).

- *Vol. 1. Learning to Read and Write: A Task Analysis (by Donald E. P. Smith)*
- *Vol. 2. Criterion-Referenced Tests for Reading and Writing (by Judith M. Smith, Donald E. P. Smith, and James R. Brink)*
- *Vol. 3. The Adaptive Classroom (by Donald E. P. Smith)*
- *Vol. 4. Designing Instructional Tasks (by Judith M. Smith)*

Phillip S. Strain, Thomas P. Cooke, and Tony Apolloni. Teaching Exceptional Children: Assessing and Modifying Social Behavior